

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 318. (No. 5, Vol. VII.)

JANUARY 29, 1915.

[Registered at the G.P.O. as a Newspaper.] [Weekly. Price 3d. Post Free, 3½d.]

Flight.

Editorial Office: 44, ST. MARTIN'S LANE, LONDON, W.C.

Telegrams: Truditor, Westrand, London. Telephone: Gerrard 1828.

Annual Subscription Rates, Post Free.

United Kingdom ... 15s. 6d. Abroad ... 20s. 6d.

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EDITORIAL COMMENT.

The Flying Services Fund.

An excellent beginning has been made with the subscription list for the Flying Services Fund, organised and administered by the Royal Aero Club, which opened last week, as our readers will have seen, with the round sum of £4,700, and is this week over £5,000, including, in addition to the subscriptions of £1,000 each from M. André Michelin and the Royal Aero Club, similar amounts of £1,000 each from Flight Lieutenant F. K. McClean and Mr. T. O. M. Sopwith. Other well-known names in the world of aviation which figure in the list are those of Mr. Alec Ogilvie with £250, and Messrs. Griffith Brewer, Norman Clark Neill, Paris Singer and A. Mortimer Singer each with £100; Messrs. A. V. Roe and Co., on account, £100; Sir Francis Layland-Barratt, Bt., £52 10s.; Mrs. Krabbé £50.

This encouraging start should be a great impetus in putting forward the claims of the Fund to the general public for generous and immediate support.

Its objects are so self-apparent in their justness that, like good wine, one might think they require no bush, but it would be fatal to the success of this magnificent scheme, if this view is allowed to prevail. At the present moment there is such a multitude of appeals for every conceivable cause, each being pushed with varying energy, according to the opportunities and channels open to

those responsible for their respective organisations, that unless the Flying Services Fund is energetically, systematically and judiciously, as it were, forced into the limelight, there is a very grave danger that the sum total gathered together for the *personnel*—and their dependents—of our Flying Services may fall far short of what those who have the Fund at heart hope for. Not only is it of vital importance that wide and continuous publicity through the columns of the general Press in London and *throughout the country* should be forced, but there is an enormous amount of work to be done in promoting the Fund's welfare through private sources—following up in every possible direction any opportunity that may arise for pressing home the special claims and the objects of the Fund.

If we appear at all persistent in urging on the body that has undertaken the duty of seeing the Fund through to do so with unceasing energy, our apology, if apology be needed, is that we are keenly anxious the results achieved shall be in keeping with the great aim in view.

As we have in the past stated, we are sanguine enough to believe that, if the Fund and its purpose are thoroughly brought home to the people of this country, the time is not far distant when the subscription list will have reached a six-figure total. For this to be achieved, however, a widespread publicity campaign must be instituted. It is quite true that already some notice has been accorded the Fund in the daily Press, but, relatively speaking, the references have been somewhat few and short, in fact we have seen practically nothing beyond extracts—and many of these very short extracts—of the official flyleaf sent out announcing the inauguration of the Fund. The Fund has not yet met with such editorial support that its importance merits, and we feel sure that, having such a well-known personage as Brigadier-General the Marquess of Tullibardine as its chairman, and with the Right Hon. Lord Kinnaird having consented to act as the hon. treasurer of the Fund, strong and irresistible influence can be brought to bear in a vast number of directions with good results. It means work and the exercise of considerable thought and energy, but this is a natural corollary to the starting of such a fund, and the fact must be grasped and followed up by action immediately.

The great work our Naval and Military Air Services are rendering in the war has been fully appreciated by the general public—indeed their appreciation has, it is to be feared, reached a point where their expectations of what our flying officers can do is, perhaps, somewhat

greater than is desirable, and we feel that the Fund only needs to be brought insistently before their notice for their purse-strings to be loosened on behalf of what is undoubtedly one of the most deserving causes in connection with the war. As the circular issued by the club states:—"In view of the great utility of the work of the Flying Services, evidence of which has been repeatedly given in the official despatches of the Commander-in-Chief, the skilful and daring flights into enemy country, and the protection afforded by the continuous patrolling of our coast by aircraft, it is confidently expected that the British public will welcome this opportunity of showing their appreciation by subscribing promptly and liberally to the Fund."

Zeppelin Raids and Damage.

When the first scare was worked up over the Zeppelin fleets which were to visit London and destroy the entire City and its inhabitants, we endeavoured to point out the absurdity of such an attempt at terrorising the weaker section of the public and hinted pretty strongly at the probability of the "frightfulness" being fostered for other reasons than those entertained by the Germans. That a huge "boom" in insurance against aircraft risks followed is significant, and when premiums began to slack off, the scare was again and again worked for all it was worth—and away soared the premiums again, to the great delight and aggrandisement of those who were gathering in the shekels as a result of this working upon the feelings of the more nervous of the population. And a pretty big haul must have been raked in up to the present time, as although a raid actually has materialised, the amount of damage and loss of life—regrettable as is the latter—has been practically negligible; no doubt other raids will follow in due course, but with more or less the same results. At the time we urged all this strongly, and suggested that a more reasonable view of the possibilities should be taken. We adopted the attitude that if tens of thousands of pounds were to be annexed from the pockets of the British public upon so flimsy a pretext, then for goodness sake let the Government come forward boldly and take in the cash, as in any case such risks should not be borne by individuals, but be made a national affair, and compensation be paid out of the Imperial Exchequer.

To quote merely one statement of what we said on this subject as long ago as October:—

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Science and Aircraft.

LECTURING on Aerial Navigation at the Royal Institution on Saturday, Dr. A. T. Glazebrook said that it was commonly supposed that the development of heavier than air machines had gone on independently of science, and that science had only come in at a late hour to check the conclusions of practical men. But aeroplane construction was more the result of scientific calculation than shipbuilding. The precise investigations of such intricate matters as air-pressures in relation to lifting power, friction, and drag had gone far towards establishing our aerial supremacy in the field. In a letter which he had received from a friend at the front, it was pointed out that one of our machines with a 70 or 80 h.p. engine could outstrip a German machine of 100 h.p. The result was that German aeroplanes were becoming rare, and during several days preceding the date of the letter none had been seen.

One of the important matters for the scientist was to increase the speed-range of aeroplanes, and Dr. Glaze-

"For ourselves, our view of the matter, as we have already stated in a previous issue, is that, if there is any real prospect of an attempted invasion, it should be a matter for serious consideration whether the Government—which, through its various channels of information, is likely to be best informed on the subject—should not be called upon to accept responsibility for any damage that might result from such an invasion. Obviously, such damage would be the direct outcome of the national conflict, and as such ought, as far as possible, to be made good by the Government. The amount of damage likely to eventuate is in any case likely to be comparatively negligible, and the moral effect upon the general public of such an effect would undoubtedly be to inspire complete confidence, and put the little army of scaremongers into the gloomy obscurity which they deserve. Even if such a suggestion does not commend itself to the authorities, there is still another proposal they might consider, and that is, seeing that they have already taken many excellent safeguards in the public interests, notably in connection with marine insurance, in the fixing of maximum food prices, the prevention of a 'corner' in sugar, &c., they should undertake the issue of war-risk policies, covering also damage from hostile aircraft, so that the many thousands of half-crowns which are now being paid over to underwriters could be diverted to the public funds as a provision against a national risk. The whole business is a national question, and not one to be left to a few cute business men out of which to make capital."

And now we are pleased to see that the Government is likely to recognise that the results of these dastardly attacks upon the unarmed section of the country should be regarded in the way suggested by us, as a message was received by the Mayor of King's Lynn on Tuesday from the Prime Minister informing him that it is the intention of the Government to take measures to deal with the damage sustained as a result of the recent air raid on King's Lynn.

This follows on a similar action after the bombardment of Hartlepool and Scarborough, in which the same principles were involved, and we shall hope to learn officially presently that the compensation is as generous and complete as it undoubtedly should be under the circumstances. What should be done about all the vast sums already paid in premiums is another matter, but that large profits should be made by individuals out of the fears of the ignorant public under such calamitous conditions as exist for the country as a nation is one of those phases of exploiting others' troubles with a vengeance, which should not be allowed to continue. It must be at least a source of very considerable gratification to the ratepayers of London that the London County Council has refused to be drawn into the net, and has declined to insure its buildings and property against such risks, and in new building contracts is inserting clauses making it clear that the contractors will not be required to take the risk of damage by the King's enemies.

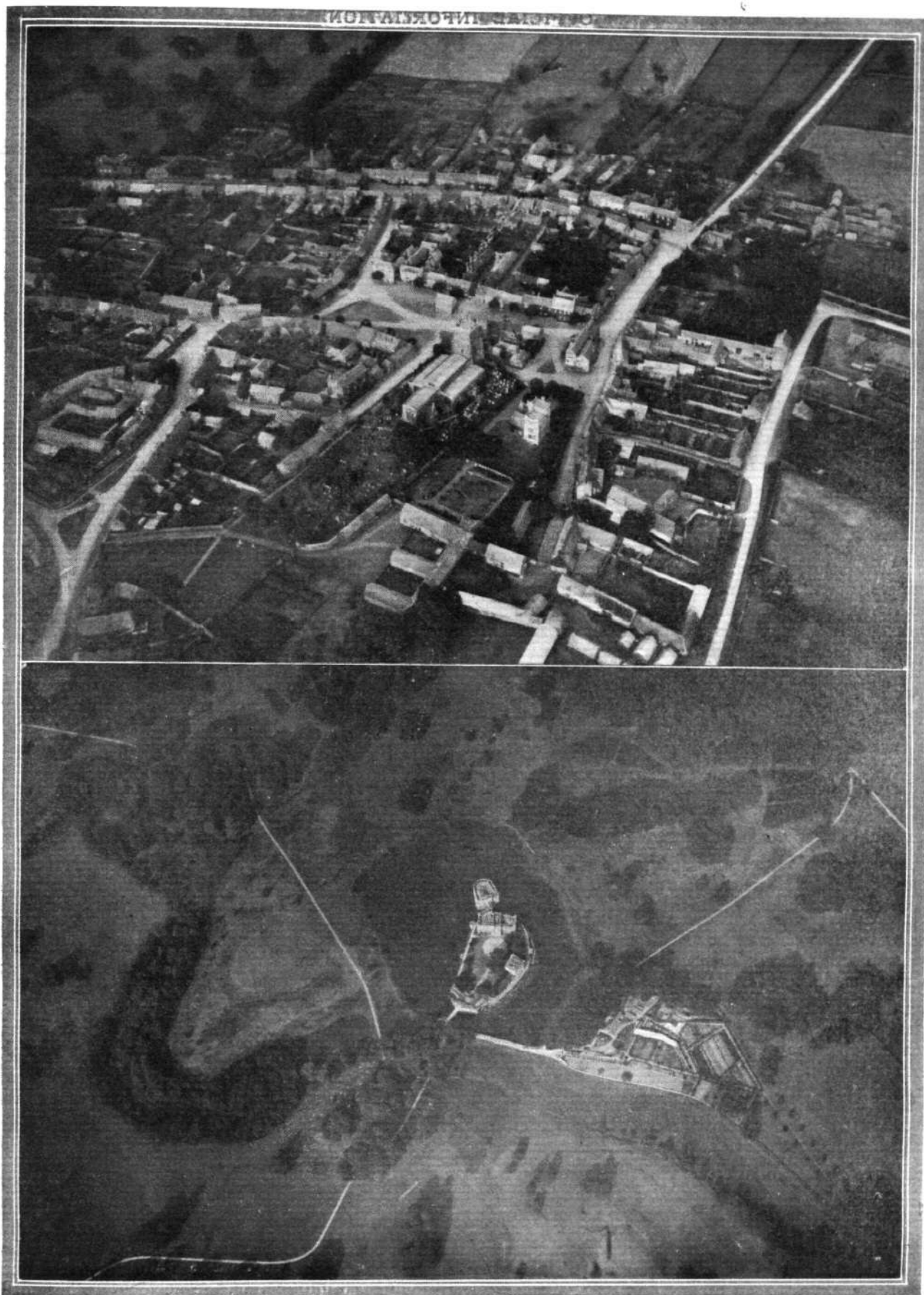
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brook pointed out that whereas in 1912 the Cody machine which won the military trials had a speed-range from 48 to 72 m.p.h., or 33 per cent., in 1914 a Sopwith machine had a range of 37 to 92 m.p.h., or 60 per cent.

To illustrate the importance of the effect of surface shapes, Dr. Glazebrook mentioned that altering the shape of the wires on aeroplanes—from round to oval—had brought about a reduction from 10 to 12 per cent. in the horse-power required for flying at 70 miles an hour.

Holland and German Airships.

ACCORDING to information to hand from Rotterdam, the Netherlands Government has instructed its Minister in Berlin to draw the attention of the German Government to the question of aircraft flying over Dutch territory. In view of the fact that on the night of the 19th–20th an airship, believed to be German, was observed over Holland proceeding in an easterly direction, the Netherlands Minister is to suggest an inquiry as to whether or not this took place.



HOW OUR COUNTRY CAN BE PHOTOGRAPHED FROM ABOVE.—Two photographs secured by Consul Gustav P. Stollwerk in the course of balloon trips which he carried out during a past summer. The top one shows Moreton, taken from his balloon "Dunlop" during a trip to Newtown in Wales, and the lower photograph is Leeds Castle, near Maidstone, upon another occasion.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

THE Secretary of the Admiralty issued the following announcement on the 23rd inst. :—

"On Friday, the 22nd, 12 or 13 German aeroplanes appeared over Dunkirk at 11.30 a.m. and dropped bombs. No particular damage was done, except that a shed in the docks was set on fire. One of the bombs fell just outside the United States Consulate, breaking all the windows and smashing the furniture.

"Belgian, French, and British naval and military air-men engaged the German aeroplanes, one of which was brought down by a British military machine just over the Belgian frontier. The German aeroplane, pilot, and passenger were captured.

"During the day visits were paid to Zeebrugge by Squadron Commander Richard B. Davies and Flight Lieutenant Richard Peirse. Twenty-seven bombs were dropped on two submarines and on the guns on the mole. It is believed that one submarine was damaged considerably, and that many casualties were caused amongst the guns' crews.

"In making a reconnoitring flight before this attack Squadron Commander Davies was on one occasion surrounded by 7 German aeroplanes, but managed to elude them. He was slightly wounded in the thigh on his way to Zeebrugge, but continued his flight, accomplished his mission, and is now progressing satisfactorily."

The following extracts are from the despatch from an "Eyewitness" with the British General Headquarters in France, dated January 19th, and issued on the 25th inst. :—

"On Saturday the weather continued dry and windy, and consequently the conditions in the trenches somewhat improved. In spite of a wind which, at an elevation of 3,000 feet, was blowing at nearly 90 miles an hour, successful flights were accomplished by our aeroplanes.

"An example of the kind of story being circulated in Germany as to our treatment of our prisoners is an article in the evening edition of the *Frankfurter Zeitung*, dated 18th December, 1914. In this—which purports to be an 'official' report—is given a deposition made by one, Volunteer Erich Callies. It is to the effect that he was captured by an English outpost and kept tied to a tree for some hours; that he was several times forced to ascend in an aeroplane in his shirt sleeves in order to point out the positions of the German troops, name the units holding them, and drop bombs upon them. According to his statement he had to submit to many interrogations and was repeatedly struck on the face if he did not answer. He finally made his escape, but became very

ill from the effects of this inhuman treatment. This deposition is supposed to have been made under oath in hospital at Leipzig-Plagwitz on the 28th November, 1914, and it is signed by Callies and two officials in whose presence it was made.

"It is hardly necessary to state that the whole story is a pure fabrication. Reference is only made to it because it is a somewhat glaring instance of the nonsense that is being published. Presumably it would not have appeared in print unless it were likely to be accepted in Germany as being true, and possibly believed in some neutral countries, where public opinion might be biased against the British. Apart from any other consideration, the absurdity of taking up in an aeroplane a private soldier who had presumably never before made an ascent, in order to ascertain the position of units of which he could have known nothing, is of itself a sufficient refutation of the story. And even if we had been guilty of this folly, we should hardly have rendered the task of the man more difficult by inflicting needless hardship upon him. The publication of this farrago in a presumably reputable newspaper betrays an astonishing credulity on the part of those responsible, or else intense malice, and a desire to trade on the credulity of others."

The Secretary of the Admiralty made the following announcement on Tuesday :—

"The Naval General Staff, Petrograd, communicate the following :—

"On Monday morning a Zeppelin appeared above Libau and had time to drop nine bombs on the undefended part of the town, and after being fired at by the forts the Zeppelin fell into the water. Small craft were sent out and destroyed the Zeppelin and took the crew prisoners."

In the *communiqué* issued by the Russian Great Headquarters on Tuesday evening, the following further details were given :—

"A German Zeppelin flew over Libau yesterday and dropped nine bombs. No damage was, however, caused, and the dirigible flew away towards the frontier. Near Virgen, our fire hit the Zeppelin, which fell into the water a verst and a half from the coast, where it was destroyed by tugs from Libau. The crew of seven were taken prisoners."

In the official *communiqué* issued in Paris on Sunday afternoon it was stated :—

"In the valley of the Aisne our batteries either reduced to silence or demolished several German guns. They also obliged the enemy's aviators to turn tail, and destroyed some works near Soupir and Heartefise."

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The Roll of Honour.

THE following casualties in the Expeditionary Force have been reported from General Headquarters :—

Under date January 19th :—

Killed.

Capt. E. F. Chinnery, Royal Flying Corps.

Under date January 21st :—

Killed.

Major G. H. Raleigh, Essex R. and Royal Flying Corps.

Capt. H. J. A. Roche, R. Muns. Fus. and Royal Flying Corps.

Under date January 24th :—

Missing.

Lieut. W. C. K. Birch, Royal Flying Corps.

Capt. Chinnery, as recorded in last week's *FLIGHT*, was killed while testing a Voisin machine in Paris. Apparently Capt. Roche lost his life while making a bomb-dropping expedition on the 19th inst. He became separated from his comrades, and the next morning his body and the wreckage of his machine were washed up at Zuidcote, about three miles from Dunkirk. According to unofficial information, the accident to Major Raleigh occurred at Malo-les-Bains, near Dunkirk, on the 20th. He was gliding down on a scout machine, when it overturned and fell into a few feet of water. Major Raleigh was terribly injured, and died in hospital a few hours later.

THE BRITISH AIR SERVICES.

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.

Royal Naval Air Service.

THE following was announced by the Admiralty on 22nd inst. :—

Mr. B. H. Mulock has been entered as Probationary Flight Sub-Lieutenant, for temporary service, and appointed to the "Pembroke III," for course of instruction at Eastchurch Naval Air Station, with seniority Jan. 20th.

The following was announced by the Admiralty on 26th inst. :—

Temporary Lieut. M. J. James, transferred to Royal Naval Air Service as Probationary Flight Sub-Lieutenant, and appointed to the "Pembroke III." To date Jan. 24th.

Royal Flying Corps (Military Wing).

THE following appeared in the supplement to the *London Gazette* issued on Jan. 20th :—

Special Reserve. Supplementary to Regular Corps.—Lieut. James Valentine to be temporary Captain. Dated Oct. 1st, 1914.

The following appeared in the supplement to the *London Gazette* issued on the 21st inst. :—

The undermentioned temporary appointment is made :—

Squadron Commander: Capt. Duncan Le G. Pitcher, 39th King George's Own Central India Horse, Indian Army, from an Instructor, Central Flying School, and to be temporary Major. Dated Jan. 22nd, 1915.

Capt. Herbert R. P. Reynolds, Royal Engineers, employed with the Military Wing, Royal Flying Corps, to be Brevet Major. Dated Oct. 30th, 1914.

The following appeared in the *London Gazette* issued on 22nd inst. :

The undermentioned appointment is made :—

Flying Officer: Second Lieut. Clifford A. Hooper, Special Reserve. Dated Dec. 18th, 1914.

Special Reserve. Supplementary to Regular Corps.—Sec. Lieut. (on probation) Malcolm McB. Bell-Irving is confirmed in his rank.

The undermentioned to be Second Lieutenants (on probation);

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The Farnborough Fatality.

AT the inquest held at Farnborough to enquire into the death of Lieut. N. L. Gardner, no further light was thrown on the cause of the accident, although it was stated that death was due to the fall and not to burns.

dated Jan. 15th, 1915: Ralph Christopher Freeman and Melville Richard Howell Agnew Allen.

The appointment of Second Lieut. (on probation) Alfred Huggins is antedated to Dec. 2nd, 1914.

The following appeared in a supplement to the *London Gazette* issued on the 23rd inst. :—

The undermentioned appointment to be made :—

Flying Officer: Second Lieut. John T. C. Moore-Brabazon, Special Reserve. Dated Dec. 2nd, 1914.

The following appeared in the supplement to the *London Gazette* issued on the 25th inst. :—

The undermentioned Warrant Officer to be Second Lieutenant for service in the field :

Royal Horse and Royal Field Artillery.—Sergt.-Major Norman Goldsmith, from the Royal Flying Corps, and is seconded for service with that unit instead of as notified in the *London Gazette* of Jan. 4th, 1915. Dated Dec. 3rd, 1914.

The following appeared in the *London Gazette* on 26th inst. :—

The undermentioned appointments are made :

Flying Officers to be Flight Commanders; dated Jan. 15th, 1915: Lieut. R. O. Abercromby, the Gordon Highlanders, and to be temporary Captain; Lieut. W. G. S. Mitchell, the Highland Light Infantry, and to be temporary Captain; and Capt. J. R. C. Heathcote, the Queen's Own Cameron Highlanders.

Flying Officer: Capt. T. W. C. Carthew, 4th Batt. the Bedfordshire Regt., and to be seconded. Dated Jan. 1st, 1915.

Second Lieut. (on probation) George C. N. Nicholson is confirmed in his rank.

The following appeared in the supplement to the *London Gazette* issued on the 27th inst. :—

The undermentioned appointment is made :

Flying Officer: Second Lieut. Harold Blackburn, Special Reserve. Dated Aug. 29th, 1914.

Central Flying School.

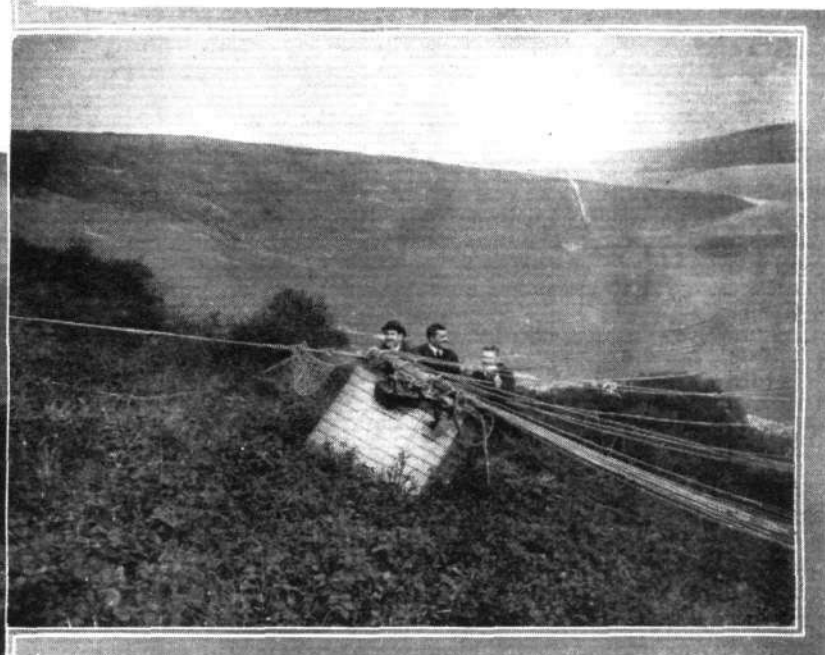
The following appeared in the supplement to the *London Gazette* issued on the 27th inst. :—

The undermentioned appointment is made :

Instructor: Lieut. (temporary Capt.) H. Le M. Brock, the Royal Warwickshire Regiment, a flight commander, Military Wing, vice Capt. D. Le G. Pitcher, 39th King George's Own Central India Horse, Indian Army. Dated Jan. 22nd, 1915.

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According to the evidence, the machine was flying perfectly at a height of about 200 ft. Then it commenced to plane down normally, but when about 100 ft. up, the machine suddenly dived almost vertically. On contact with the ground the engine was thrown forward on to the petrol tank and the wreck burst into flames.



How our country can be photographed from above. Landing on the coast with a balloon. Consul Stollwerck just after anchoring his balloon near Newhaven after a trip during a past summer.

THE SPERRY GYROSCOPIC STABILIZER.

IN our issue of July 3rd of last year we gave a very brief description of the Sperry gyroscopic stabilizer. This week we supplement our previous article with a description of the gyro by Mr. Lawrence B. Sperry and an *exposé* of a demonstration before the Aero Club of America on December 8th last. For these and the accompanying illustrations we are indebted to the Editor of our New York contemporary, *Flying*.

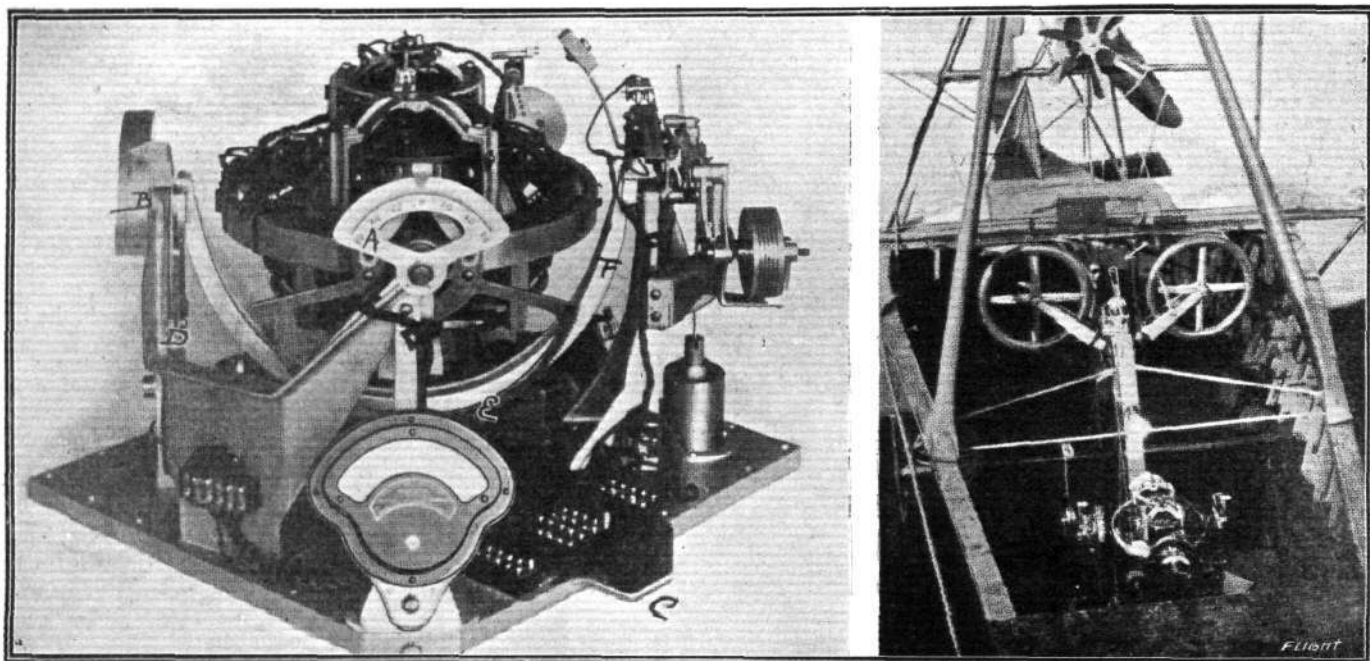
"In the design of a machine for artificially accomplishing what Nature has already accomplished, we cannot do better than to adopt the principles which Nature has adopted as the result of infinite knowledge and infinite experience. In the design of a flying structure no human being can hope to equal the results obtained by Nature in her design of the bird. As an illustration of this point it is interesting to note that the flying machine was first made practicable by imitating the wing tips of a bird. Close study of the bird's wings and of its general characteristics as a flying structure shows that Nature has provided the bird with an automatic stabilizer in the form of the sense of equilibrium which serves to automatically

is the only means of obtaining such a result. The problem is not an easy one. A single gyroscope cannot be used, because, to prevent it from wandering, it must be made pendulous, and when made pendulous it is badly affected by acceleration and centrifugal forces. If two gyroscopes are coupled, they are capable of maintaining one axis only, and even then they are impracticable, as they will be disturbed when the aeroplane turns. For instance, suppose the gyros are used for maintaining a traverse axis so that they will indicate longitudinal departures for the correct flying position; when the aeroplane turns it must bank—when banked, the turning movement will have a component about the transverse axis of the aeroplane which will result in throwing the gyro pair out of operation.

"There are many other problems encountered in an application of the gyroscope to this purpose. A technical description of these problems, and of the method adopted by us for solving them, would be long and tedious. Let it suffice to say that the problem has been solved and that the result is:—

"(1) Perfect maintenance of a true horizontal plane, regardless of any movements of the aeroplane;

"(2) Elimination of the effects of centrifugal force or acceleration pressures.



THE SPERRY GYROSCOPIC STABILIZER.—On the left, general front view of gyroscopic element. A. Lateral inclinometer. B. Longitudinal inclinometer. C. General terminal for all wires. D. Longitudinal impressor gear. E. Lateral impressor gear. F. Bow (the means for getting long motion outside the element). On the right, the Gyroscopic Stabilizer mounted on the Curtiss aeroplane. The small lever between the control wheels, shown by the arrow, controls the longitudinal and lateral inclination of the aeroplane.

and instinctively maintain the bird's stability by operating its wing tips or other appendages, thus generating righting couples without movement of the bird itself. Thus the bird is built to fly through disturbed air conditions without any departure from its normal attitude. The only movements which are seen to be made are slight movements of its wing tips or appendages. In our mechanical birds or aeroplanes this instinct of the bird has been replaced by the aviator. In some rare instances aviators, such as Garros, Pegoud, and Beachey, seem to have been endowed with a super-instinct of equilibrium—as unflinching and unerring as that of the bird. Even in these cases, however, the aviators are subject to fatigue. The aviator of ordinary ability is not only subject to fatigue, but must for his safety depend upon certain base lines, such as the earth's horizontal, and these base lines may disappear—as in fog.

"A careful analysis of the problem shows that the first, foremost and all-important requirement is a base line which will hold the true horizontal plane regardless of any motions or forces created by the aeroplane in flight.

"If we can fulfil this requirement we will have replaced the aviator's imperfect sense of the horizontal with an instrument which will at all times indicate the angular position of the machine with relation to the horizontal, both laterally and longitudinally.

"It can be said without fear of contradiction that the gyroscope

"The base-line so obtained would be of value as a clinometer for indicating to the aviator his departure from the horizontal, laterally or longitudinally. In the Sperry Stabilizer a much higher result is obtained by using this base-line to automatically operate through the aid of a servo-motor the ailerons or wing-tips for lateral control, and the rudders or tail surfaces for longitudinal control. In both lateral and longitudinal controls there is interposed between the gyro base-line and the servo-motor a floating lever to permit of setting the aeroplane for any inclination laterally or longitudinally, without disturbing or shifting the gyroscopic base-line. Longitudinal control from the gyro equipment is coupled by means of a floating lever to a hand-operated device, which permits the aviator to set the machine for any inclination of climb or descent, the gyros serving to maintain the machine at this angle.

"A further device in the form of an anemometer serves to *vol plané* the machine in case its speed drops below the critical speed. When this anemometer device operates, it automatically prevents the aviator from setting the automatic stabilizer for a climb until a proper speed has been obtained, after which the control is given back to the aviator. By means of a foot-pedal the pilot of the machine may at any time cut out the automatic stabilizer and resume hand-control.

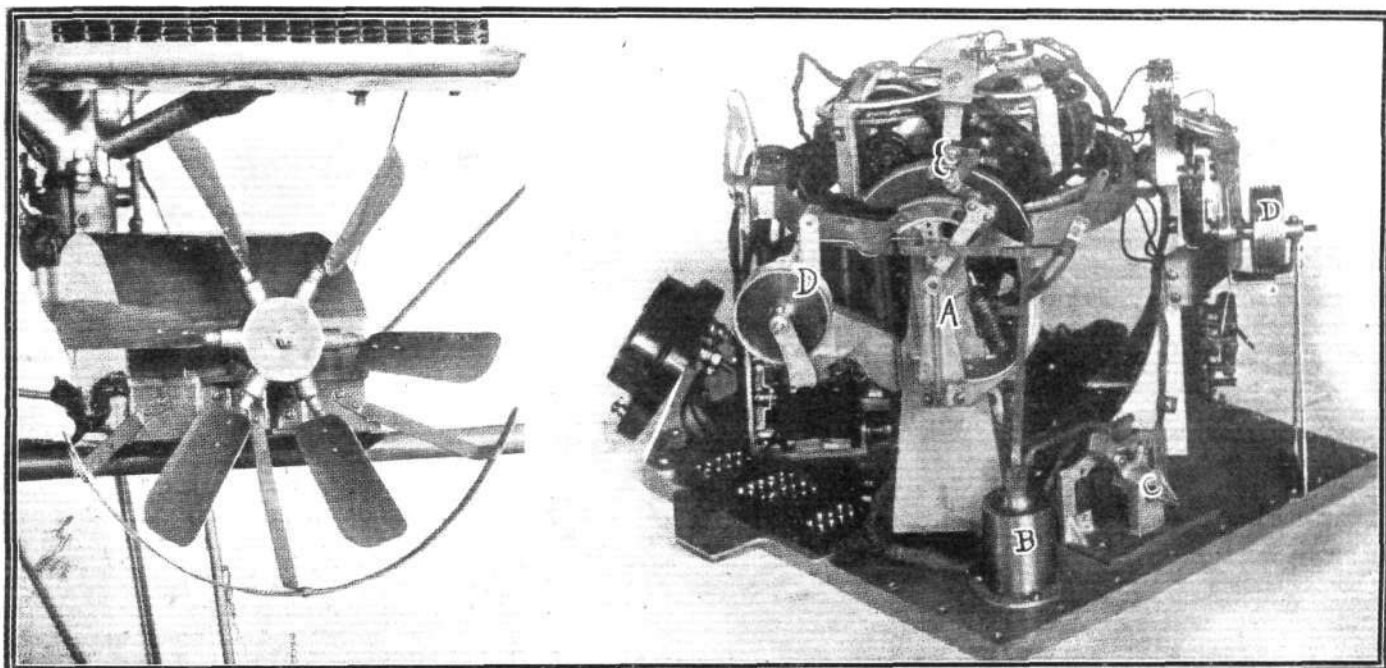
"In comparing a machine fitted with this automatic stabilizer to

the bird fitted with nature's stabilizer, we see that the gyro base-line corresponds to the bird's highly developed semi-circular canals, which instantly feel tipping about any axis; the air pressure device corresponds to the bird's muscular impressions, which instinctively feel speed, and the hand-setting device makes the aviator the equivalent of the bird's eyes, which tell it how to steer. The servo-motors correspond to the bird's muscles, and the *ailerons* and rudders to its wing-tips and tails.

"The Sperry machine is small and compact, and may be applied to any aeroplane without change in design. The arms, which are operated by the servo-motors, are arranged to be directly connected to the levers or wires for hand-control, without changing them. The small gyros weigh about 2 lbs. each. They are rotated at 12,000 revolutions per minute by alternating current derived from a small generator driven by the main engine. This generator weighs about 14 lbs. and may be used for wireless as well as for driving the gyros.

"In case of failure of the aeroplane engine the gyros have sufficient speed for properly functioning for a period of about thirty minutes.

"The weight of the entire plant is about 40 lbs. The Sperry-Curtiss Automatic Stabilizer has been fitted in a Curtiss flying boat for over a year, and many automatic flights in bad weather have been made, as well as many automatically controlled landings and starts.



THE SPERRY GYROSCOPIC STABILIZER.—On the right, side view, showing: A. Longitudinal follow-up gearing. B. Solinoid for auto-vol plané. C. Impressor motor. D. Follow-up wire works in groove. E. Trolleys for carrying current to Servo motor. On the left, the Servo motor installed (note control wires under the motor).

"A series of demonstrations of the Sperry Gyroscopic Stabilizer before a committee of the Aero Club of America began on Thursday, December, 8th. The committee included Messrs. Alan R. Hawley, Charles Jerome Edwards, Henry A. Wise Wood, Evert J. Wendell, W. Redmond Cross, Robert Pluym, Howard Huntington, V. J. Mayo, Henry Woodhouse.

"Before giving the first demonstrations Mr. Lawrence B. Sperry, who has had charge of the experiments under the general direction of his father, Mr. Elmer A. Sperry, submitted to the committee a copy of the following *exposé* of what he was undertaking to demonstrate, explaining that it is an exact translation of the *exposé* submitted to the French authorities in the contest of last May, when the Sperry Gyroscopic Stabilizer was awarded the \$10,000 prize, excepting in paragraph 5, where the use of two levers has been changed to the use of a single lever.

"Mr. Sperry also explained that the device represented a general improvement on the one used in the French contest, having been simplified in some points and standardized in a general way.

"The *exposé* submitted by Mr. Sperry is as follows:—

"A.—An explanation of the Aeroplane used and the method of operation of the apparatus.

"You are asked to especially observe the following:

"1. The aeroplane used is the well-known Curtiss Flying Boat with the controls arranged on the usual Curtiss system operated

solely by hands and shoulders. The feet are not used in any way in controlling the machine.

"2. The servo-motors of the automatic stabilizer are directly connected with the same controls that the aviator would ordinarily operate by hand.

"3. A simple foot treadle can instantly throw both the lateral and the longitudinal controls into or out of operation at will. When the automatic control is thrown into operation, it moves the controls when there is any relative movement between the aeroplane and the gyroscopic base-line. This will be demonstrated by moving the gyroscopic base-line, the gyros being stopped in this case. When the machine is in flight, the rotation of the gyros holds the structure in which they are mounted truly horizontal regardless of all movements of the machine.

"4. When the automatic stabilizer is in operation, the controls are held with perfect rigidity, and the pilot cannot use them even if he wishes.

"5. When the automatic stabilizer is in, the pilot uses the small lever controlling the aeroplane longitudinally, and laterally. He is then entirely relieved of the task of stabilizing the aeroplane, and uses this lever only for directing the flight. Motion of this lever to the right or left controls the turning and lateral inclination; backward and forward controls longitudinally, ascent and descent.

"B.—Demonstration of the action of the Automatic Stabilizer when an upsetting force is applied in flight.

"6. The passenger making this flight weighs about 160 lbs.

"7. The machine will rise from the water in the usual manner, and fly under automatic control.

"8. Automatic lateral control will first be demonstrated as follows: The passenger will leave his seat, and climb out on the wing to one side for a distance of between $1\frac{1}{2}$ and 2 metres from the centre of gravity of the plane. While this is being done, the machine will be under automatic control.

"Observe that:

"(a) The upsetting couple applied by the passenger is between 200 and 225 lb. feet.

"(b) The pilot is showing that the machine is under automatic control by moving out of his controlling seat and holding his hands above his head.

"(c) The aeroplane is held perfectly level by the operation of the automatic control.

"(d) As the passenger moves out on the plane, the angle at which the *ailerons* meet with the air gradually increases to automatically compensate for the upsetting couple. As the passenger returns toward the centre, the *ailerons* gradually return to their normal position.

"9. Demonstration of automatic longitudinal control. The

passenger will leave his seat, climb up on the lower plane, and go backward, approaching the propeller as closely as possible.

"The upsetting couple in this case is about 120 lb. feet.

"The same points should be observed as given under No. 8, *i.e.*, that the machine is entirely under automatic control, that the longitudinal inclination of the aeroplane does not change, and that the rudder is now compensating for the upsetting couple.

"C.—*Demonstration to Observers, who will make flights as passengers in the demonstrating machine.*

"The passenger is asked especially to observe the following points:

"10. After gaining speed on the water, the automatic stabilizer will be thrown in and the aeroplane will rise from the water under complete automatic control. In rising from the water, and in controlling the angle of climb of the aeroplane, the pilot uses the small lever to the left.

"11. The aeroplane flies smoothly and evenly, with almost complete absence of the so-called 'bumps.'

"12. The pilot is relieved from all work of stabilizing the machine and has only to direct its flight, which task becomes simpler and easier than steering a motor car. The pilot will from time to time place his hands on the steering wheel for the purpose of keeping the machine on a straight course of flight. When the pilot touches the steering wheel, while the automatic stabilizer is in operation, he cannot in any way assist the apparatus in stabilizing the machine, because the controls are rigidly held by the servo-motors.

"13. The gyroscopic base-line, *i.e.*, the structure in which the gyroscopes are held, constantly maintains the horizontal plane. The graduated circles on this device act as an accurate clinometer, constantly indicating the inclination of the machine laterally and longitudinally.

"14. The gyroscopic base-line is causing the controls to *ailerons* and rudders to make very small smooth movements. These movements are instantly counteracting each disturbing effect simultaneously with its occurrence.

"15. By operating the foot treadle the pilot can instantly throw out the automatic control and assume hand control. Note the difference in smoothness of flight when automatic control is thrown out.

"16. When the pilot throttles his engine, and in that way approaches too closely the critical speed necessary in order to sustain the aeroplane, the automatic air velocity device operates to *vol plané* the machine to an angle of about 20°.

"17. When the automatic air velocity device has *vol plané* the machine, the pilot cannot regain automatic longitudinal control until the *vol plané* has brought the speed of the machine back to normal.

"18. When the aeroplane turns, automatic control continues to operate, although the pilot can use any angle of banking he wishes.

"19. When the speed of the engine is reduced, all parts function as before. The automatic stabilizing device is independent of the engine for a time sufficient to enable the pilot to make a landing or re-start the engine in case the latter accidentally stops.

"20. The pilot alights on the water with the aeroplane under full automatic control.

"On the above-mentioned date the tests began with a general

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German Views on the Air Raid.

THE following message—described as officially inspired—giving the German view of the Zeppelin raid on the East Coast last week was received in Amsterdam on the 21st inst. :—

"Our airships, in order to attack the fortified place of Great Yarmouth, were obliged to fly over other places, from which, it is stated, they were fired at. These attacks were answered by throwing bombs.

"England has no right to be indignant, as her flying machines and ships in broad daylight attacked open towns such as Freiburg, Dar-es-Salaam, and Swakopmund.

"Air war is acknowledged to be a means of modern warfare as long as it is carried out within the rules of international law. This has been done by our dirigibles.

"The German nation has been forced by England to fight for her existence, and cannot be forced to forego legitimate self-defence, and will not do so, relying upon her good right."

What Our American Cousins Think.

IN contrast to the above, it is interesting to note the following comments from the New York Press. In the

inspection of the apparatus mounted on the Curtiss flying boat, Mr. Lawrence B. Sperry explaining the principle, the different parts, and connections. Then the following members of the committee were taken for demonstration flights: Messrs. Alan R. Hawley, Charles Jerome Edwards, Henry Woodhouse, Robert Pluym. In each case the aeroplane, after gaining speed on the water, rose from the water under perfect and entire control of the stabilizer, and thereafter, until the time of touching the water again, in landing, the aeroplane was controlled entirely by the automatic stabilizer. In each case Mr. Sperry invited the passenger to 'pilot' the aeroplane by moving the lever which controls the direction of the aeroplane, both right and left and up and down, and the passengers found it incredibly easy and effective. Though they had never learned to pilot an aeroplane, their experience being entirely limited to flights made with other pilots, they found that they could pilot this aeroplane with greater ease than they could drive an automobile; and though at the signal of Mr. Sperry they moved the lever far to the right and left and backwards, causing the aeroplane to turn and climb at steep angles, they did not experience any 'slipping.' On the return trip in each case passenger and pilot climbed on the seats and waved their hands at the rest of the committee below, leaving the instrument to pilot the machine and correct the unbalancing effects of their motions.

"At the conclusion of these trials a long flight was made by Messrs. Sperry and Henry Woodhouse from the Bayside Yacht Club, Bayside, Long Island, where the hangar was located, to the Queensboro Bridge, where Mr. Woodhouse landed. It usually takes half an hour to cover this distance by automobile; it only took the flying boat eleven minutes.

"The aeroplane practically flew itself all the way. Messrs. Sperry and Woodhouse sat on the edge of the boat practically all the way, and the gyroscopes operated the machine.

"The first trial having been carried out in fair weather conditions, the committee waited three days for rough weather before holding the second. On December 6th, the first day of the storm period which swept Long Island and New Jersey, the following gentlemen went to attend the rough weather tests: Alan R. Hawley, Henry Woodhouse, Robert Pluym, Glenn H. Curtiss, William H. Williams, W. Benton Crisp. When the place was reached the wind had turned into a gale, and the water was rough and high. The boat was made ready and Messrs. Sperry and Pluym climbed to the seats, and the machine was pushed out of the hangar, with a rope fastened to the tail, to hold it while the wheel attachment, which is used for rolling the machine in and out of the hangar, was being detached. As soon as the machine left the protection of the hangar a puff of wind blew it to one side, heading it for a wooden platform nearby. While they were attempting to turn it facing the wind the gale increased in violence, and became too violent to allow a safe landing on the narrow beach if a flight was made. So it was decided to beach the machine until the gale had subsided or the direction of the wind had changed. On the following day the gale reached the height of fury and swept away houses and trees. Sperry's hangar was an easy prey and had the aeroplane been inside it would have been wrecked. As it was, part of the wreckage was blown against it and caused serious damage to the boat and the wings. So the tests had to be temporarily postponed, until Mr. Sperry replaces the machine and builds a new hangar, which he is doing."

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course of an editorial on the subject the *Tribune* expressed regret that :—

"... a great forward step in civilisation like the invention of aircraft should be seized on as a pretext for ignoring the limitations of civilised war codes, and for going back to the wanton brutality of three or four centuries ago.

"The fact that the invaders use airships does not relieve them from the restraints of civilised war. Such an attack does not differ in its essence from an attempt to massacre non-combatants. Civilisation revolts at the relapse from humane military methods which the war has shown to be setting in, and will eventually find some means of stamping out the recrudescence of brutality which subjects women, children, and male non-combatants to the same treatment as armed men."

The *Sun*, in commenting upon the raid, adopted the same attitude. It said :—

"An airship attack on unfortified places has no military value; there is no glory in it; it stimulates recruiting among the people outraged; it offends the moral sense of neutrals everywhere and alienates them. Therefore it is an amazingly stupid as well as a barbarous kind of warfare. Attempts to justify it insult the intelligence of the whole civilised world."

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

THE FLYING SERVICES FUND.

Administered by The Royal Aero Club.

THE Lords Commissioners of the Admiralty and the Army Council having signified their approval, the Royal Aero Club has instituted and will administer a fund originated by M. André Michelin for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependents of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

In view of the great utility of the work of the Flying Services, evidence of which has been repeatedly given in the official despatches of the Commander-in-Chief, the skilful and daring flights into enemy country, and the protection afforded by the continuous patrolling of our coast by aircraft, it is confidently expected that the British public will welcome this opportunity of showing their appreciation by subscribing promptly and liberally to the fund.

The Right Hon. Lord Kinnaird has kindly consented to act as Honorary Treasurer to the Fund.

Subscriptions should be forwarded to The Flying Services Fund, The Royal Aero Club, 166, Piccadilly, London, W., or to Barclay and Co., Ltd., 1, Pall Mall East, London, S.W. Cheques should be crossed "Barclay and Co., Ltd."

TULLIBARDINE, Brig-General,
Chairman of the Royal Aero Club.

The following subscriptions have been received up to the 27th inst. :—

	£	s.	d.		£	s.	d.
A. Michelin ...	1,000	0	0	C. G. Grey ...	5	0	0
The Royal Aero Club ...	1,000	0	0	Flight - Lieutenant F. K. McClean,			
J. E. Pearce ...	5	0	0	R.N.A.S. ...	1,000	0	0
C. G. Grunhold ...	5	0	0	Alec Ogilvie ...	250	0	0
Noel Pemberton ...				Griffith Brewer ...	100	0	0
Billing ...	5	0	0	Paris Singer ...	100	0	0

	£	s.	d.		£	s.	d.
James Radley ...	25	0	0	J. J. Acworth ...	21	0	0
T. O. M. Sopwith ...	1,000	0	0	W. H. Willcox ...	5	5	0
W. Oswald Watt ...	20	0	0	G. S. Wilson ...	5	5	0
A. Mortimer Singer ...	100	0	0	L. S. Snell ...	0	12	0
Arthur Sykes ...	1	1	0	Sir Francis Layland-Barratt, Bart. ...	52	10	0
J. K. Burbridge ...	5	0	0	Washington Wood ...	5	5	0
Ernest H. Coles ...	5	0	0	W. J. Leonard ...	5	0	0
Oscar Coles ...	5	0	0	W. Mair Rolph ...	5	5	0
Norman Clark Neill ...	100	0	0	J. Duncan Pearson ...	1	1	0
A. J. A. Wallace Barr ...	5	5	0	Oliver W. Thomas ...	5	0	0
Editor FLIGHT ...	10	10	0	G. G. Astley ...	1	1	0
Henry Wagner ...	5	5	0	Mr. and Mrs. W. W. Loughby Price ...	5	0	0
Lady Tredegar ...	5	0	0	A. V. Roe and Co., Ltd., on account ...	100	0	0
The Hon. Lady Shelley ...	5	0	0	Francis J. Sharpe ...	5	0	0
C. H. B. ...	2	0	0	Capt. E. W. Wakefield ...	2	2	0
C. Capron ...	1	1	0	The Integral Propeller Co., Ltd. ...	10	10	0
Mrs. R. S. Henderson ...	2	2	0	Auguste Oddenino ...	2	2	0
Mervyn O'Gorman, C.B. ...	5	5	0	J. E. Rosen ...	1	1	0
P. J. Taylor ...	10	10	0	F. Warren Merriam ...	5	0	0
Harry Preston ...	5	5	0	Ernest C. Bass ...	10	10	0
Charles E. Shepherd ...	5	5	0	G. A. Scott ...	2	2	0
Mrs. Krabbé ...	50	0	0	Rubery, Owen & Co. ...	10	10	0
R. A. Wall ...	5	5	0	Miss Curtis ...	2	2	0
"Rat" ...	1	1	0	J. and A. W. Sully and Co. ...	2	2	0
E. C. Wynne ...	0	10	6	Members and Friends of "The Midhurst Musical Society" ...	5	0	0
Rev. Geo. H. Ford ...	1	0	0	Anonymous ...	1	1	0
Mrs. Mortimer Ford ...	5	0	0	W. N. Child ...	5	0	0
Mrs. George Cumming ...	5	0	0				
Mrs. Carleton Tufnell ...	50	0	0				
Miss Primrose ...	10	0	0				
F. L. Bartelt ...	1	1	0				

Aviators' Certificates.

- The following Aviators' Certificates have been granted :—
- 1041 Lieut. Myles Teignmouth Sandys, R.G.A. (Maurice Farman Biplane, Netheravon Flying School, Netheravon). Dec. 25th, 1914.
- 1042 2nd Lieut. Harold William Medlicott, R.F.A. (Maurice Farman Biplane, Military School, Brooklands). Jan. 18th, 1915.
- 1043 Ernest Edwards Hodgson (Maurice Farman Biplane, Military School, Brooklands). Jan. 19th, 1915.
- 1044 Louis William Yule (Maurice Farman Biplane, Military School, Brooklands). Jan. 21st, 1915.

B. STEVENSON, Assistant Secretary.

166, Piccadilly, W.

FROM THE BRITISH FLYING GROUNDS.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Monday last week, Probationary Flight Sub-Lieuts. Digby, Hallifax, Hilliard, Petter, Souray and Wood straights with Instructors Manton, Russell and Winter. Probationary Flight Sub-Lieuts. Wood solo straights, and Besson circuits, ready for *brevet* tests.

Tuesday, Probationary Flight Sub-Lieuts. Digby and Walmsley solo straights; Besson, Driscoll, Mills, Walmsley and Mr. Greenwood solo circuits, eights, &c. Probationary Flight Sub-Lieuts. Hallifax, Hilliard, Petter, Souray and Wood straights with Instructors Manton, Winter and Russell.

Wednesday, Probationary Flight Sub-Lieuts. Hallifax, Hilliard, Petter, Souray and Wood straights with Instructors Manton, Russell and Winter. Probationary Flight Sub-Lieut. Mills and Mr. Greenwood circuits, &c.

Thursday, Probationary Flight Sub-Lieuts. Walmsley,

and Besson solo circuits, &c. Digby solo straights, Hallifax, Petter and Wood straights with Instructors Manton, Russell and Winter.

Saturday, Probationary Flight Sub-Lieut. Besson circuits, &c., and afterwards *brevet* tests; gained certificate in excellent style. Probationary Flight Sub-Lieut. Digby and Mr. Greenwood solo straights. Probationary Flight Sub-Lieuts. Hallifax, Hilliard, Petter, Souray and Wood straights with Instructors Manton, Russell and Winter. Probationary Flight Sub-Lieuts. Walmsley and Mills circuits, landing practice, &c.

Beatty School.—Although the weather experienced during last week was not very suitable for school work quite a lot of flying was done. The following pupils received instruction :—Messrs. C. Leeston-Smith (25), J. D. Newberry (15), E. T. Anstey Chave (44), P. E. Cornish (20), G. Merton (25), G. Beard (42), G. Donald (60), G. Perrot (9), T. F. Roche (7), B. de Meza (5),

M. J. V. Miller (7), Lieut. Bannatyne (83), J. H. Ormsby (35), A. G. Hayward (20), V. E. Fanning (5), Gerrit Forbes (36), H. H. Bright (22), F. R. Laver (17), J. H. Moore (9), P. C. Cooper (5), and Lieut. Broughton (20).



Copyright F. N. Birkett from the F.N.B. series of aviators.
Probationary Flight Sub-Lieut. P. E. H. Wakeley, who gained his brevet at the Grahame-White School, Hendon.

Machines in use were two-seater biplanes fitted with "dual" controls, the Instructors being Messrs. Geo. W. Beatty, E. Baumann and G. Virgilio.

Hall School.—Instructors: J. L. Hall and J. Rose. Pupils rolling during last week: Waterson (8), Cini (4), and Davy (6) improving. Straight flights on No. 3: J. W. McConnochie 10 at 6 ft. On Sunday, in spite of

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EDDIES.

EVIDENTLY Australia is rapidly waking up to the possibilities of aerial navigation, thanks in a great measure, no doubt, to the good pioneer work done by the few enthusiasts who have taken machines "down under" to demonstrate not only their own prowess in the art but the progress which has been made generally in the development of the heavier than air type of aircraft. That the lighter than air side of the problem is now also receiving the attention of our cousins beneath the Southern Cross is evidenced by the fact that a small dirigible has been constructed by Mr. A. J. Roberts, of Sydney. It has a length of 80 ft. and a diameter of 20 ft., with a capacity of 20,000 cu. ft., and the general arrangement will be seen in the photograph below. This is not so bad for a start.

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Capt. Penfold, who will be remembered as a pupil at the Bristol School some year or so back, is lending his aid, and he piloted the airship on a cruise which took place on Saturday, September 26th last, at Melbourne. Starting out from the Show grounds at 7 a.m. he soon reached an altitude of 1,500 ft., at which height he found the wind rather troublesome. Determined, however, to make an extended trip with his new mount, Capt. Penfold kept on for half an hour, until he caught sight of the open fields round Broadmeadows, when, as the wind showed no signs of abating, he decided to come down. Throwing out a drag-rope, and letting out a small amount of gas, the little craft began to descend

an extremely strong wind, which kept all the other civilian schools in their sheds, Mr. Lloyd Williams, after making a few short flights on No. 3, ascended to 500 ft. on the 45 h.p. *brevet* machine, doing good circuits and eights, with splendid landings. But for darkness intervening he would have gained the first half of his "ticket."

London and Provincial Aviation Co.—Monday, last week, Mr. Noakes rolling; Messrs. Bransby Williams and Collett straight flights.

Tuesday, Mr. Noakes rolling; Messrs. Bransby Williams, Henderson, Moore, and Laidler straight flights; Mr. Collett half circuits; Mr. Abel circuits.

Wednesday, Messrs. Noakes and Lincoln rolling; Mr. Derwin hopping; Messrs. Laidler, Henderson, Moore, and Bransby Williams straight flights; Mr. Collett half circuits; Mr. Abel circuits.

Thursday, Mr. Lincoln rolling; M. G. Smiles test flight. Friday, wet and windy. Saturday, Mr. Derwin hopping; Messrs. Noakes and Lincoln rolling.

Instructors during the week: Messrs. Warren and Smiles.

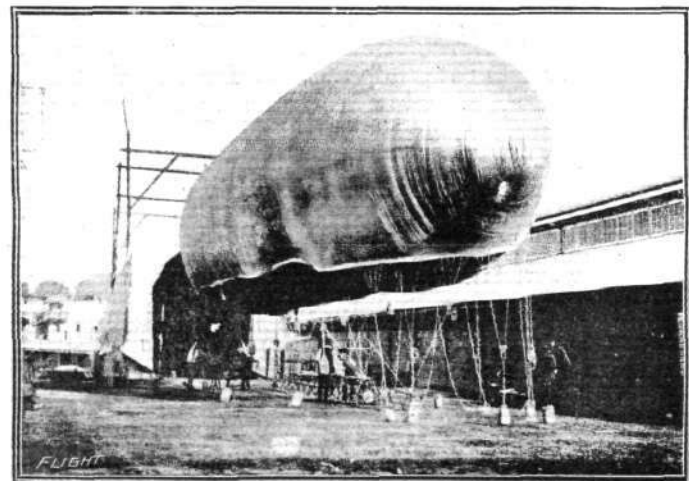
Northern Aircraft Co., Ltd.

The Seaplane School, Windermere.—There has been a lot of good flying during last week. Mr. Rowland Ding out giving instruction to Messrs. R. Buck (50), A. Johnson (55), T. Hubbard (34), G. L. Railton (35), and E. Ashley (18). Mr. R. O. Lashmar (165) has been doing good circuits, and is now ready for his ticket. Mr. A. Johnson was taxiing.

On Friday, as the weather cleared in the evening, Mr. Ding continued instruction after dark, making landings by moonlight—which is a distinct and valuable innovation in tuition. It was only the large extent of the Company's flying ground that made it possible.

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until she was so low down that a resident was able to catch hold of the rope. This helped to steady her, and a final use of the ripping cord promptly brought her to earth. A number of soldiers quartered at Broadmeadows became so interested that they broke ranks, and ran to the assistance of Capt. Penfold, for which, it is rumoured, they were put into the guard tent for breach of discipline. Thus ended the first cruise of a dirigible in Victoria, but there is no reason why many others should not soon follow.



The Australian-built baby dirigible.

It is quite surprising what a number of new interesting machines have made their *début* in the U.S.A. during the last year or so, and in reviewing the ever-growing list of newcomers one cannot help noticing how the general trend of design seems to be in the direction of the fast tractor biplane. Sorting out mentally those that come to mind, a goodly number of the more recent ones are clearly influenced by German practice as regards their general lay-out. Several of them have the arrow type or back-swept wings, to which class belongs also the little biplane illustrated in the accompanying photograph. This machine was designed by Mr. Frank Pontkowsky and built by the Schaap-Sestak Aviation Co. of Chicago. It is fitted with a 50 h.p. Gnome engine, and is said to be a very fast and steady little machine to handle. Among the pilots who have flown it is, I believe, Earl S. Daugherty, who claims to have flown more different types of machines than any other American aviator.

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Looking over some old aeroplane catalogues the other day, I came across one from a firm whose products, printed as well as constructional, are always very artistic. This particular catalogue was so beautifully "got up" that it was a joy to look through it quite apart from any interest attaching to the machines illustrated therein, and so absorbed was I in the perusal of the fleecy clouds depicted that it was only by the merest chance that I happened to notice what may have been a mere mechanical mistake on the part of the artist, or did he mean it as a suggestion for the next machine to be turned out from this factory? Ordinarily the machine in question is driven by a stationary engine which everybody has hitherto considered to be of ample power for the work it has to do, but the artist must have thought otherwise, for attached to the crankshaft of the stationary engine was a Gnome motor, the propeller working between the two. The arrangement, although possibly presenting certain mechanical difficulties, opens up vistas of immense possibilities!

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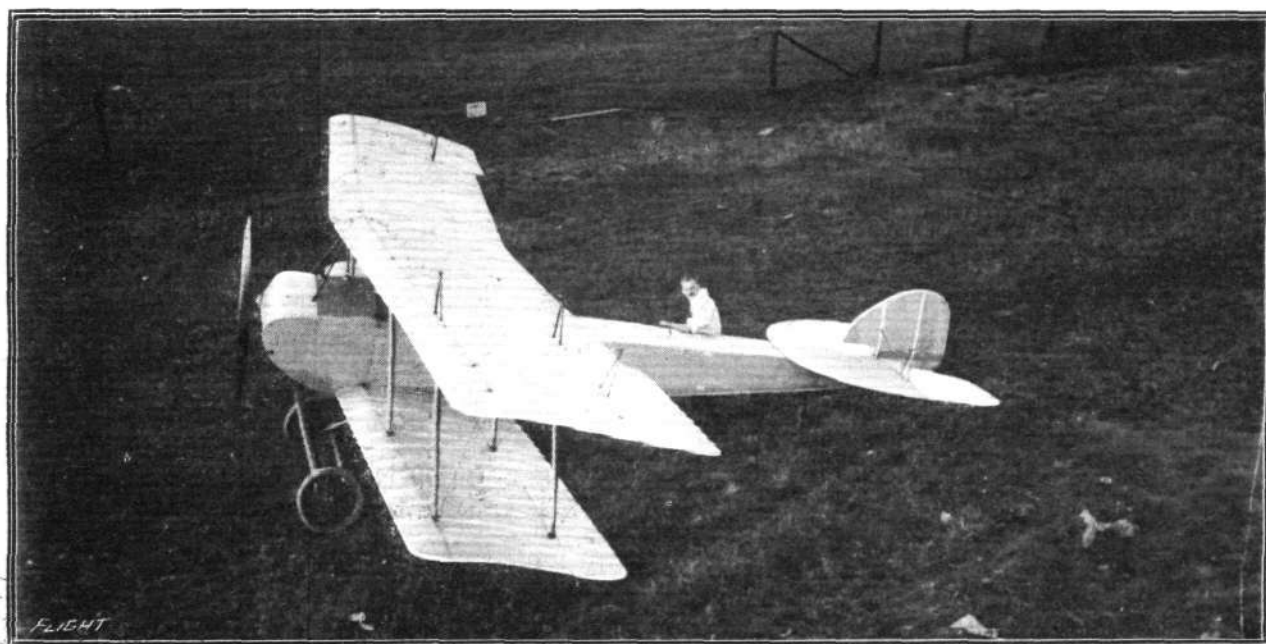
Although the Germans have not up to the present succeeded in paying the long-promised visit to London by air, it appears that their raid on the East Coast has infused a certain amount of nervousness into at least one

Londoner, for, so the story goes, when the other day the tyre of a motor car burst with the usual ear-racking report, a lady who was near by threw herself flat on the pavement shrieking at the top of her voice, "Zeppelins! Zeppelins! Bombs! Bombs!" As the Germans seem to be very well informed of what is going on in this country, they will probably not be slow in making capital of this incident in the form of articles describing the terror that German aircraft have instilled into the entire populace of London. It is hardly to be anticipated that they will elaborate the mirth of other passers by at the antics of the frightened lady, as to reveal such unnecessary details would hardly be in keeping with German policy. But then the German never did see a joke in the same sense that it is viewed by British. Their humour is so ultra-refined, you know.

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I happened across in a German contemporary, an interesting account of the testing of a new machine which, according to it, appears to have been evolved at the Potucek works in Prague. The inventor is Adolf Rilp of that city. Then come regrets that owing to the war no particulars can be published, although the new machine has been patented. Already in the preliminary trials the machine, according to our contemporary, showed remarkable lifting power. The object of these tests was to run in the engine and transmission gear. One of the three cylinders of the 20 h.p. motor was cut out, but in spite of that as soon as the engine had reached about half of its revs., 700, the machine lifted and had to be held down, otherwise it would have flown out of the yard and away over the house tops! Luckily the driving-chain came off its sprocket, the wing stopped and the machine came gently to earth. The next trials are to be conducted at the Bohemia hangars at Zilow. What impresses our German contemporary most is the low horse-power required to lift the weight of the helicopter (for such I presume it to be), which is stated to be 350 lbs. when the engine was only giving about 7 h.p. When the Rilp helicopter starts helicoptering with all the cylinders firing, evidently our Avro and Sopwith and Martinsyde scouts will have their work cut out to catch up, in spite of their good climbing capabilities.

"ÆOLUS."



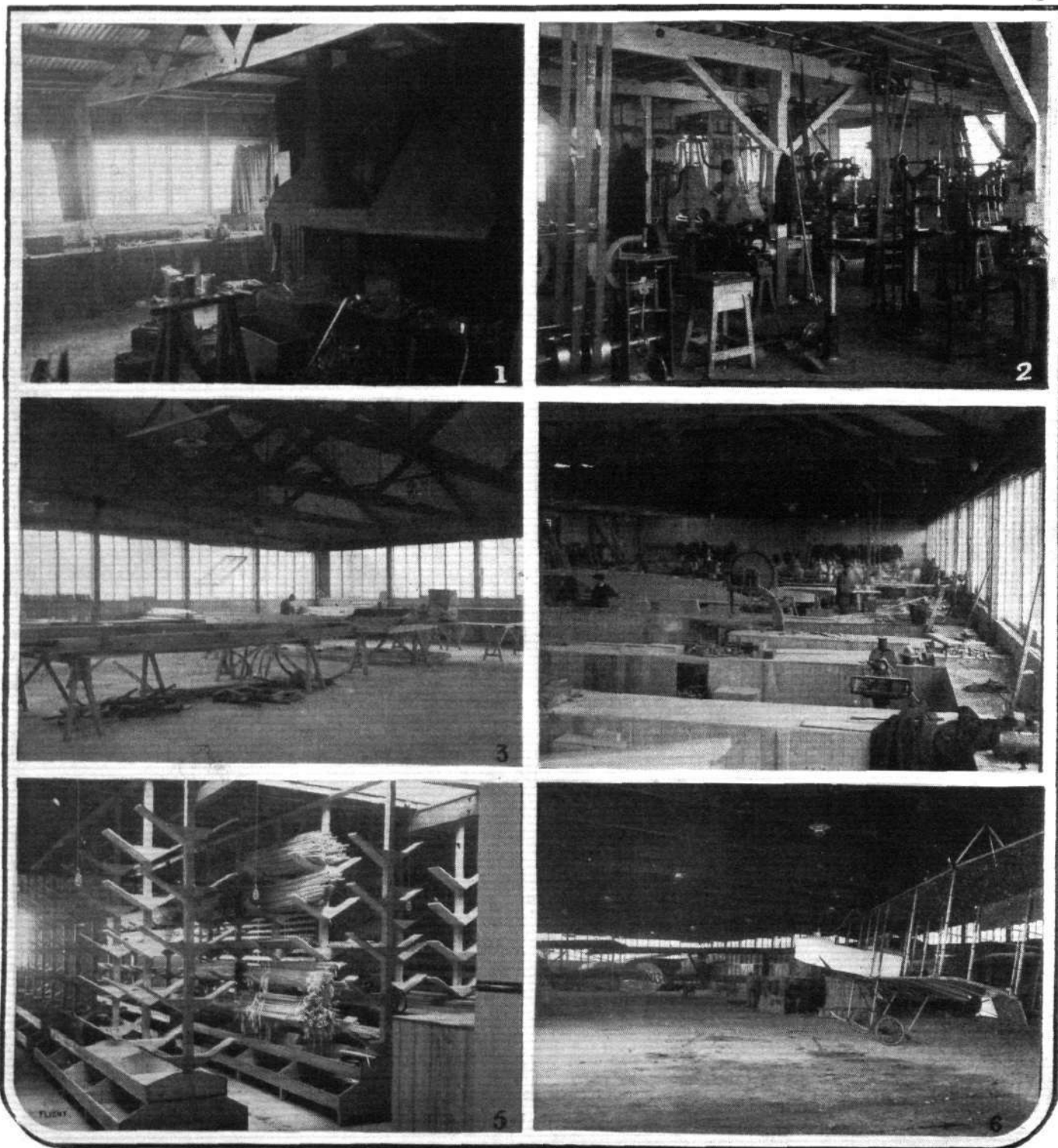
The 50 h.p. Pontkowsky tractor biplane built by the Schaap-Sestak Aviation Co. of Chicago, and flown by Earl S. Daugherty.

BRITAIN'S AERONAUTICAL INDUSTRY.

II.—THE GRAHAME-WHITE AVIATION CO., LTD.

THE Grahame-White Aviation Co. hold a unique position in the aeronautical industry of this country, in that not only are aeroplanes designed and constructed at the company's works at Hendon, where also pupils are instructed in the art of flying, but, until the outbreak of war, exhibition flying on an extensive and elaborate scale was organised, the value of which, from an educational standpoint, cannot be over-estimated.

Mr. Grahame-White's association with the London Aerodrome dates from the very earliest days, as on giving up his school at Pau in 1910, he transferred his six Blériots to Hendon, and opened a flying school and exhibition ground there. In the middle of 1911, however, a company under the title of the Grahame-White Aviation Co., Ltd., was formed to take over the management of the aerodrome, which had previously been run



THE GRAHAME-WHITE AVIATION CO.'S WORKS AT HENDON.—1. A corner of the metal-working shop, showing the acetylene welding plant and the smiths' forges. 2. The machine shop. 3. A part of the covering and dope shop. 4. The wood-working shop, with the sawmills in the foreground. 5. The new store rooms. 6. The erecting shop.

by a syndicate, and the new Company were fortunate enough to secure the services of the late Mr. Richard Gates as their general manager, Mr. C. Grahame-White—who now holds the rank of Flight Commander in the R.N.A.S.—being managing director. From that time the Company has been uniformly successful, so that whereas in July, 1911, there were only about twenty-four men employed, now there are over four hundred, and business is continuously increasing. That such a pleasing state of affairs exists is undoubtedly due to the excellent management under which the undertaking has been carried on, and much credit in this connection is due to Mr. J. D. North, the works manager, Mr. G. H. Mansfield, assistant works manager, Mr. T. Kemp Walton, secretary, and Mr. W. Law, the foreman of the works, as well as to those we have already mentioned, who were responsible for placing the business of the firm on a sound basis.

At first, the works attached to the school were simply used for effecting repairs to the school machines; but in course of time, the construction of aeroplanes was undertaken. During his visit to the States in 1910, when he succeeded in winning the Gordon-Bennett Trophy, Mr. Grahame-White designed a "Baby" racing biplane, and one of these machines made its appearance at Hendon in February, 1911, and proved very successful. Since then many machines of different types have been turned out of the works—some being entirely new designs of the propeller type of biplane, while others have been monoplanes mostly of an improved Morane type. The firm are now extremely busy with both B.E.2's and monoplanes. Practically every operation required to be performed in the construction of the machine is normally conducted on the premises; but recently, owing to the high pressure of work since the outbreak of war, certain minor parts have had to be put out. These parts, when delivered at Hendon, are subjected to rigorous inspection to ensure that the same high standard of workmanship is maintained as is to be found in the work turned out from the firm's own workshops.

Immediately on entering the works are the general stores, where the hand tools, materials and various accessories are kept and issued to the workmen as required in the course of their work. At the back of these stores is a testing shop, in which a testing machine has been installed and where all materials purchased are examined to see that they reach the specified figures for strength, hardness, &c.

Turning to the right, the metal working shop is entered. This is in two parts—one, the first, forming the main shop, whilst the other, which is on a low level, includes the acetylene welding plant and the smiths' forges. In the main shop, the component parts of the various metal fittings are assembled together after pressing or machining, ready for the welder, and when welded together, are finished off. They then go to the inspection department, from whence they are passed into the stores until such time as they are required. Further on is the machine shop, well equipped with all the machine tools and appliances necessary for the manufacture of the

various metal parts of an aeroplane, including lathes and machines for drilling, milling, copying, emery polishing, stamping, as well as a large stock of dyes, &c.

On the floor immediately above the machine shop is the works inspection department, where all parts are examined to see that they come within the specified limits of accuracy, as well as for any signs of defects in the material or workmanship before being sent to the stores. Still higher up, is the roomy, well-lighted drawing office—the brain of the works—where a large staff is accommodated, who have at their disposal many modern drawing office requisites, including a printing machine. Here every endeavour has been made, as is also the case elsewhere in the works, to economise both time and material, and to reduce any possibility of inaccuracies creeping into the drawings to a minimum. Each separate detail part is traced upon a separate sheet, upon which is printed the data that should accompany the drawings—part number, kind and size of material to be used, number required, &c.

So far it is the old part of the works that has been dealt with. Adjacent are the erecting shops and the hangars for housing the machines attached to the school. To provide for the continual growth of the work in hand, as well as for future contingencies, a new substantially-constructed building has been erected at the extreme end of the aeroplane sheds. This building has a total superficial area of 32,000 sq. ft., and is divided into four parts. The largest part, which fronts on to the aerodrome, and is provided throughout its length with sliding doors, is 200 ft. long and 100 ft. wide, and is to be used as the erecting shop. At the back of this shop are—the woodworking shop, with which is also the saw-mills and other wood working machinery, and the covering and doping shop; whilst the stores for finished parts is interposed between them.

Communicating doors between the stores and the two shops are provided so as to render it unnecessary to bring the finished parts into the erecting shop before delivery to the storekeeper. The important bearing of ample light and equable temperature upon the output per man has been remembered in arranging the building, and so all the new shops are well provided in these respects with means for efficient and adequate heating, lighting, and ventilation.

At present, the large erecting shop is used for housing completed aeroplanes, and hence the major portion of the finished parts are kept down in the old sheds; but very shortly it is expected that all the work on the erection of machines, wing and body covering and doping will be done in the new buildings. Still further extensions, to accommodate the plant now in place in the old buildings, are under consideration, and will probably be commenced in the near future, as plans for another new building, half as large again as that which has just been completed, have been accepted by the Company. The whole of the manufacturing side of the business will then be done in the new premises, and the old buildings will be used for the housing and repair of school and exhibition machines.

Reduced Lighting at Havre.

AN order which came into force last Sunday has been issued by Admiral Charlier, Governor of Havre, restricting the lighting of the town and the communes of Sainte-Adresse, Sanvic, Gravelle-Sainte-Honorine and

Harfleur, from sunset to daybreak no light from private dwellings must be visible from outside, the lighting of public establishments, factories, shops, &c., must be reduced to what is strictly necessary, and lights must as far as possible be screened.

AIRCRAFT AND THE WAR.

ACCORDING to the *Echo de Paris*, in addition to the new sheds at Berchem near Brussels, the Germans have built two sheds near Longwy for airships to be used for raids on Paris.

Telegraphing from Sluis on the 20th inst., a correspondent of the *Tyd* reported:—

"There has recently been great activity by English aviators over Ostend, where large numbers of bombs have been thrown on military depôts and railway stations. No civilian has been injured, although several German soldiers were killed. At night aeroplanes have been flying over German positions, employing searchlights. They have covered an area extending almost to the Dutch frontier."

According to a correspondent of the *Nieuwe Rotterdamsche Courant* at Arnhem a traveller arriving there on the 21st from Germany reported that aeroplanes belonging to the Allies' armies appeared above Essen on the previous day and threw bombs. He himself had seen several buildings badly damaged, apparently as the result of having been hit by bombs. Information obtained by the *Handelsblad* was to the effect that the aviators were British and that a large repair shop, together with 400 motor cars, was completely destroyed. It was also stated that the German Government had since secured a motor car works at Aix-la-Chapelle for which a large number of Dutch workmen had been engaged at high wages.

Mr. James, writing to the *Daily Mail* from Rotterdam on the 21st inst., said:—

"I learn from Maastricht that the Germans, fearing reprisals after the Zeppelin raid on the English east coast, have ordered lights to be extinguished, especially at Cologne, where extraordinary precautions have been taken against air raids and where there is a Zeppelin shed."

Writing of the recent fighting round Soissons, a *Morning Post* correspondent in Paris, said on the 21st inst.:—

"Aeroplanes render unexpected concentrations extremely difficult unless by organisation one side can beat the other for rapid transport, as was the case with von Kluck's reinforcements north of Soissons."

"Speaking of aeroplanes leads me to describe a typical battle scene in the districts I have recently been visiting. From the little hill behind a certain château one could see with glasses (even without) a German captive balloon used for observation purposes. A sausage-shaped thing, but obviously with a bigish dependent car, it was naturally some distance away to the rear of the German lines. Yet, of course, if we could see it so well it could see the country where we were. Round it kept hovering aeroplanes, apparently numbers of them, which seemed waiting for an opportunity or an order to come across our way. This, of course, they did from time to time."

"Now the manoeuvres of an aviator when he comes to spy out a troublesome battery are distinctly interesting. Apparently he advances until shrapnel begins to worry him. Then he describes a circle, always, I suppose, watching downwards to locate the place whence the fire is coming. I have seen him drift away further until within the zone of another battery to the rear, but unless this also interests him he returns to his first point. Should he be successful he drops his smoke rockets (generally three) and shoots away back to his line. The coolness of them is amazing, because they accept chances even with angry French aeroplanes coming rapidly up against them. Many times I have wondered that they were not hit by the shrapnel that was obviously bursting all about them. Yet it is hardly surprising that so many escape, considering that the vital parts of the fighting aeroplane are armour-plated, that from below the pilot is invisible, and that the wings can sustain many perforations by bullets without having their efficiency impaired. On the French side also there are aeroplanes doing useful work, and it must always be remembered that both sides are aloft watching the other, even from a distance, so that the aerial drama is ever full of thrilling interest. From the little hill mentioned above I watched three German and two French aeroplanes manoeuvring about at a very high altitude, as to all appearances a snowstorm was rapidly coming up, which proved to be the case. Just as one became anxious as to the fate of the two French machines if they should have been caught in the storm they simply shot to earth in the most wonderful direct *vol plané*. This would go to show that even if an aeroplane be put out of action when operating over the fighting zone it can always regain its lines by planing."

A *Daily Mail* correspondent, writing from the North of France on the 21st inst., said:—

"One of the enemy's airmen carried out a very daring flight yesterday afternoon by coming as far as Etaples, a dozen miles farther along the coast than Boulogne. The noise of the motors was considerably deadened by the strong wind which was blowing from the sea, so that the machine, flying at a great height, was able to approach the town quite unnoticed. The airman, with great skill, planed down when over the town and, bringing the nose of his machine round to the wind, hovered over the goods yard adjoining the railway station sufficiently long to drop a couple of bombs."

A *Daily Telegraph* correspondent sent the following from Copenhagen on the 21st inst.:—

"According to a special correspondent in Vienna a most exciting, dramatic air fight took place over Przemysl. An Austrian airman ascended from the besieged fortress in the endeavour to carry letters to headquarters. He was immediately chased by Russian aviators, and the chase finished with a collision high in the air between a Russian aeroplane and the Austrian. The Russian aeroplane was smashed."

Mr. W. Beach Thomas, writing to the *Daily Mail* from the North of France on the 21st inst., said:—

"The Wednesday morning bombardment of Furnes almost coincided with another air raid on Dunkirk. Early in the morning—and dawn is the favourite hour of the airmen—two German aeroplanes were seen approaching Dunkirk from the north. They were fired at as they approached, and at once turned, but on their way back dropped two bombs on Givelde, possibly aiming at one of the canal bridges. The result here was a few broken panes of glass."

"The airmen, of course, when baulked of their proper destination, often drop bombs merely to be rid of them. They are not pleasant companions for an airman when he comes to the ground."

A *Daily Mail* correspondent at Flushing, on the 22nd inst., reported:—

"A French airman landed this morning a few miles from Flushing. He said that he had been making a reconnaissance in Belgium and that the Germans shot at him. He was wounded and was therefore obliged to land. He did not know that he was over Holland. He will be interned here."

The following account of the air raid on Dunkirk last week was sent by the *Times* correspondent in Northern France on Saturday:—

"Dunkirk was again attacked by German aircraft yesterday, making the third attack within a month. Sixty six bombs were dropped on the town and its suburbs. Nine civilians were killed, including an old woman, and several injured. Two of the enemy aeroplanes were brought down. The first had its reservoir pierced by a shot from a British aeroplane. It descended at Ghyvelde. The two officers in it, who were wearing British khaki caps, were made prisoners. The machine, which is in excellent condition, was brought into Dunkirk to-day. The other enemy aeroplane was struck by a shell from an anti-aircraft gun. It fell at Bray-les-Dunes, and its occupants were killed."

"The raid began at 10 o'clock yesterday morning. The weather was calm, bright, and cold. Six aeroplanes were observed approaching from the Belgian frontier, flying high in the clear blue sky. French and British aviators immediately ascended to intercept the enemy and give them battle. But the enemy aircraft changed their course and disappeared from view. It was supposed that they had abandoned their attempt on the town in view of the preparations made for their reception. The excitement which had been caused by their appearance quickly subsided. But half an hour after mid-day an enemy aircraft was again seen approaching. It was quickly followed by several others, flying very high. They had apparently flown out to sea to escape observation, and were now approaching the town from the direction of Gravelines. As soon as they came within range the anti-aircraft guns opened fire upon them, and British and French aircraft went up in pursuit."

"For three-quarters of an hour the battle in the air raged furiously, and two of the enemy aircraft were brought down. The sky was speckled with the white puffs of bursting shrapnel. It was a fascinating spectacle, and many of the townspeople, undeterred by falling bombs, remained in the streets to watch it."

"Notwithstanding the fusillade of the guns and the fire of our aircraft the enemy aeroplanes circled over the town and dropped many bombs. The first of them fell on the Place de la République,

where the front of an ironmonger's shop was demolished. Other bombs were thrown on the docks. Some were incendiary bombs, and a cotton shed was set on fire.

"Three bombs struck the United States Consulate, in the rue Emmercy, the Uruguay Consulate, in the Quai du Lenghenaer, and the Norwegian Consulate, in the Place de la République. Thirty bombs were thrown on the suburbs. The enemy aircraft then disappeared, but they returned at 3 in the afternoon and dropped further bombs.

"Another German aeroplane flew over Dunkirk at midday to-day, and dropped four incendiary bombs on the Chantiers de France. The fire was quickly extinguished."

The following was included in the "wireless" news officially sent out from Berlin on the 25th:—

"According to Parisian reports, about ten German flying machines undertook a new successful attack on Dunkirk yesterday. A large military warehouse, containing great quantities of supplies and English troops, were struck by the bombs and caught fire, being completely destroyed. In other respects also considerable damage was done, and about twenty persons were struck by the bombs, seven of whom were killed. After the German aviators had fulfilled their mission they were pursued by a large number of English and French aviators, the latter succeeding in forcing one German machine to descend. Two German aviators, the occupants of the machine, were taken prisoners."

According to information received from Petrograd on Saturday the Russian fleet sunk near Sinope the steamer "Georgios," bound for Trebizond and having on board sixteen aeroplanes intended for the use of the Turkish army in the Caucasus.

An Exchange Telegraph Co.'s correspondent at Leyden reported the following on Saturday:—

"Fishermen who have just arrived at Noorbwyk state that last night they saw an airship founder in the sea. They were unable to render any assistance. From their description the airship must have been a Zeppelin. The weather at the time was clear with occasional gusts of wind."

Writing to the *Daily Telegraph* regarding the conditions at Nancy at the present time, Mr. E. Ashmead Bartlett said:—

"The only excitement is the occasional visit of a Taube, which drops a bomb, whereof no one takes the slightest notice. Nancy does not even turn down its lights at night. These frontier towns despise and laugh at both aeroplanes and Zeppelins. They have lived in close proximity to the danger too long. On the evening of our arrival we learnt for the first time of the Zeppelin raid over England. This caused the English members of the party some mild excitement, but aroused not the smallest local interest, the news occupying about a quarter of a column in the papers."

In a *communiqué* issued in Berlin on Saturday it was stated:—

"Hostile airmen yesterday unsuccessfully threw bombs near Ghent and Zeebrugge."



Aircraft in the Naval Fight.

IN a narrative of the naval action on Sunday, given by one of the crew of a British battle-cruiser to Mr. F. W. Memory, a special correspondent of the *Daily Mail*, it was stated:—

"There was no sign of the enemy at dawn, but soon after eight o'clock on Sunday morning we got word that they were not far off. Air scouts first got sight of them."

In a subsequent message, writing of the sinking of the "Blucher," Mr. Memory said:—

"To add to her plight German aircraft from Heligoland—but whether a fleet of aeroplanes or an airship, there is a curious divergence of opinion—mistook the 'Blucher,' according to the story of a German prisoner, for one of the British fleet and dropped bombs on her and hastened her end."

Another *Daily Mail* correspondent, in giving further details of the action, said:—

"A new phase of the closing stages of the battle has just become known. As the fleeing German ships retreated to their own waters several units of Germany's vaunted aerial fleet came out to harry the pursuing English vessels with pinpricks from the air. The drone of their motors was heard in the sky, and our seamen,

A *Morning Post* correspondent at Amsterdam, writing on the 23rd inst., said:—

"About five o'clock on Friday afternoon an aviator flew over the Bruges docks and threw several bombs. In spite of heavy shrapnel fire he succeeded in escaping without injury in a south-westerly direction.

"According to news received from Ostend, no bombs have fallen on that town.

"A telegram from Deventer to the *Telegraaf* states that between Friday night and Saturday morning air-craft were audible over that place. No flash-lights were, however, observed."

Writing from Rotterdam on Sunday, a *Daily Mail* correspondent said:—

"Although the German official report on the raid by the Allies' aeroplanes, in which bombs were dropped on Ghent and Bruges on Friday afternoon, denies that any damage was done, I learn from the same source from which I obtained the news of the raid on Friday evening that stores at Bruges were set on fire, including the petrol tanks.

"The Germans were hopelessly outclassed by the number and speed of the Allied aeroplanes, which during the mild weather of the week-end have been active in surveying the enemy's troop movements by way of the Menin Railway junction in the direction of La Bassée."

A *Daily Mail* correspondent at Copenhagen, in an account of the torpedoing of the German cruiser "Gazelle" in the Baltic on Monday, said:—

"The 'Gazelle' informed the German Admiralty by wireless of the attack, and a Zeppelin airship arrived on the scene of the fight to-day."

According to information to hand from Petrograd, the Zeppelin destroyed on Monday near Libau, the official account of which is given on p. 72, was the LZ19. The captain, three officers, and three men were taken prisoners.

Mr. J. M. N. Jeffries, in a message to the *Daily Mail* from Cairo, on Wednesday, said:—

"The bombs which a British waterplane recently dropped in the vicinity of an advance party of Turks near Bir Muhadat inflicted some losses on a Turkish column, which promptly fled."

In a recent issue of the *Hamburger Nachrichten* an article headed "We Have Only One Enemy" contained the following:—

"A striking proof of this phrase is the new prizes which, according to the official 'Reichsanzeiger,' have been set apart for special military achievements. Three of the four prizes are aimed against England, and consist of sums of money from £25 to £125. These amounts will be awarded to the first soldier who steps upon the soil of Great Britain as a combatant, to the crew of the airship which before December 31st, 1915, accomplishes a first flight to the English coast and drops explosives on English territory, and to the aviator who drops the first bomb on Dover."



glancing upwards, saw the familiar scouting Taubes sail into view. No airships were in use, but about half-a-dozen aeroplanes were sent out to pelt our minor craft with bombs. 'We were actually trying to save their drowning sailors when the Huns came overhead dropping bombs on us,' said a bluejacket in an explosion of indignation. 'Our whaler was overside pulling out to where the drowning Germans were struggling when the bombs began to fall.'

"They dropped all round her, some ahead and some astern, but we were manœuvring fast about, and we were lucky to escape. One or two fell perilously near to our whaler though."

Inquests on Air Raid Victims.

At the inquest held at Yarmouth on the 21st inst. relative to the deaths of Samuel Alfred Smith and Martha Maud Taylor, victims of last week's aircraft raid, the jury returned a verdict to the effect that both deaths were caused by injuries received from bombs discharged by hostile aircraft.

At the inquest held at King's Lynn on the same day to inquire into the deaths of Maud Gazeley, 26, and Percy Goate, 14, the jury said the verdict was that the deceased met their deaths by an act of the King's enemies.

Models

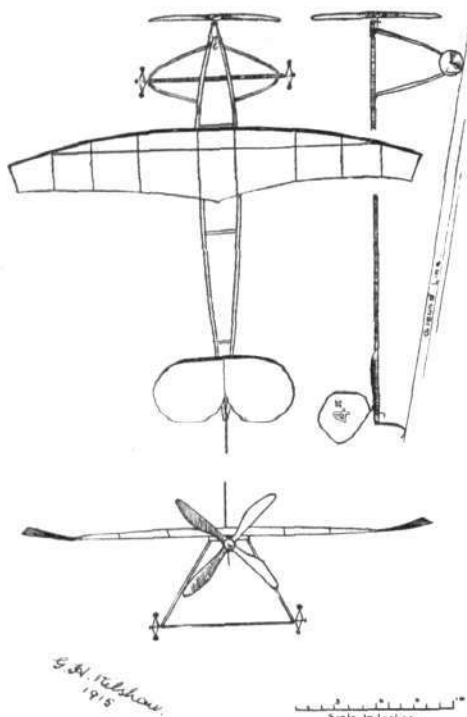
Edited by V. E. JOHNSON, M.A.

An r.o.g. Tractor Monoplane (No. 4*).

By G. H. KILSHAW.

IN this model the planes are constructed of 18 g. hard drawn steel wire, covered with jap silk; the fin is of the same materials.

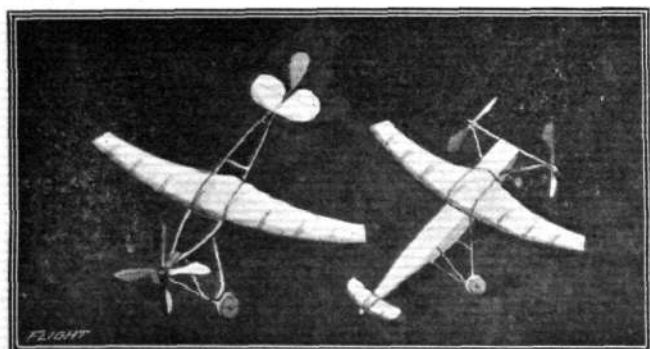
The main plane is 31 ins. by 5½ ins. at centre, and 2 ins. at tips. Tail, 10 ins. by 5 ins., the vertical fin is 5 ins. by 4 ins. Fuselage,



Mr. G. H. Kilshaw's r.o.g. tractor No. 4*.

30 ins. long and 3 ins. at the greatest width. The four-bladed tractor screw is 10 ins. in diameter, and 15 ins. pitch, and is driven by 8 strands of ¼-in. strip rubber.

It is an extremely quick model to leave the ground, and a very stable flyer; the main plane has a slightly negative angle of incidence at the tips. In flight the model was extremely slow, and a treat to watch, one being able to keep pace with it and note its actions during flight. The machine undoubtedly owed its flying qualities



Mr. G. H. Kilshaw's tractor and enclosed fuselage models.

to the four-bladed screw, which runs very smoothly, a marked improvement on a two-bladed propeller.

The simple chassis is constructed of bamboo, and no skids are fitted, the wheels being 2½ ins. in diam., and made of ½-in. 3-ply wood with copper bushes.

The snapshot of tractor in flight is by J. Owens, January 16th.

A main plane similar to the above was fitted to a triple-member enclosed fuselage, and driven by twin 10-in. propellers, with 8 strands ¼-in. strip rubber. The elevator being 10 ins. by 2½ ins., with a dihedral angle of 1 in 6. The enclosed body measured 30 by 2½ by 2½.

The tractor's best timed flight to date was made on January 16th in spite of a gale. I had considerable difficulty in getting the machine clear of the ground owing to gusts beating it down, but once up the model made no mistakes, and executed a fine flight, considering weather conditions, of 34 secs. The best flight of the



Mr. G. H. Kilshaw's No. 4* r.o.g. tractor in flight.

"canard" model is 23 secs. The snapshot shows the highest flight with a tractor, that I have had.

What Constitutes a Scientific Model?

"I have continually been asked to define a properly built model aeroplane," writes Mr. G. H. Kilshaw, "and I think the following could be applied successfully to the ordinary machine:—

"1. To be properly designed, it should possess at least more than one fuselage member per propeller, and in the case of a twin-screw model the propeller diameter should not exceed one-third of the span.

"2. The fuselage should not exceed the main plane.

"3. Wheels should be at least one-twelfth diameter of main plane length.

"4. The machine should be fitted with a substantial chassis strong enough to avoid damage on landing, and built to enable the model to stand any length of time in its proper attitude."

[Perhaps other readers of FLIGHT will kindly favour us with their views on this subject?]

The Paddington and District Aero Club.

We have received from the Hon. Sec., Mr. W. E. Evans, a copy of the balance sheet of the club for 1914. From a financial point of view the club is in a very satisfactory state. "The one regrettable feature," says Mr. Evans, "is that the membership remains practically stationary. This problem will have to be tackled at an early date. I believe all model aero clubs, with one or two exceptions, are more or less similarly affected. It seems to me that lack of advertisement is one if not the chief cause, at any rate, in our case. Flying in public grounds or commons is certainly favourable to obtaining recruits, but this advantage we do not possess, nor do we desire it. The advantages of a private flying ground such as ours, especially for research work, are patent to all experienced model flyers. Arrangements have been made to start outdoor research work in earnest early next month, and I think we ought by the end of the season to obtain some practical results."

Personally we think that a club which can have cash in hand and keep up its membership, under present existing national conditions, is doing extremely well, quite as well perhaps as it can reasonably expect.

Aeromodellists Serving with the Colours.

Paddington and District Aero Club.

M. H. Canning	... Lieutenant, Royal Engineers.
A. Levy	... Lance-Corporal, Kent Royal Rifles.
F. W. Johnson	... Private, Middlesex Regiment.

Mr. John S. Gordon, of the Nigerian Land Contingent, writes us as follows from Warri, S. Nigeria, West Africa:—

"I have been out here about 20 months now, and I don't think I have missed a single issue of my old favourite FLIGHT, which is sent out to me every mail. In the latest number to hand I notice your excellent idea of compiling a 'Roll of Honour' of members of model clubs now with the forces. As an old member of the Scottish Aeronautical Society Model Aero Club, might I ask to be included in this? I am now a member of the Nigerian Land Contingent for the period of the war. This branch of the service is for the defence of this country, working in conjunction with the native regiments here, and is similar to the Territorial Force at home.

"My only exciting job so far has been a trip to Lagos, as escort to some German prisoners. There was not much fun in this, however, as the beggars did not in the least attempt to break their parole.

"Our troops operating in the Cameroons recently captured two German aeroplanes there.

"With regard to aviation, this country offers excellent opportunity to test the worth of aeroplanes, 'hydros' in particular, as it is full of big, wide rivers and creeks. When I arrived here first I made many experiments with models, but working sixty hours a week and in a hot climate like this did not leave me much time or energy to give my pet hobby the same attention it had at home.

"This country is very up to date as regards motor cycles and cars among the educated native classes, and I should not be surprised to see aeroplanes here in the near future. Wishing every prosperity to FLIGHT and all the model clubs in 1915.

"JOHN S. GORDON, Pte.,
"Nigerian Land Contingent (Vols.)."

Mr. E. Prockter's Model (Hon. Sec. Westcliff and Leigh Model Aero Club).

Specification: Fuselage.—3 ft. 6 ins. long, made up of two longitudinals of satin walnut $\frac{3}{8}$ in. by $\frac{1}{4}$ in., with four inter-fuselage struts of $\frac{1}{8}$ in. in length; braced across centre kingpost with fine piano wire. *Main Wing.*—3 ft. long by 5 ins. broad, cambered 1 in 10; front and back spar is $\frac{3}{8}$ in. by $\frac{1}{4}$ in. satin walnut; cambers $\frac{1}{8}$ in. by $\frac{1}{16}$ in. ash. *Elevator.*— $\frac{1}{16}$ in. birch, 11½ ins. long by 1½ ins. broad, cambered 1 in 20, and risen up on a $\frac{3}{8}$ in. block fixed with rubber band. *Propeller.*—1 ft., carved from an Evans' shaped block. *Motor.*—"Duplex" $\frac{1}{2}$ in. gear, driven by two skeins of six strands $\frac{1}{8}$ in. strip rubber each.

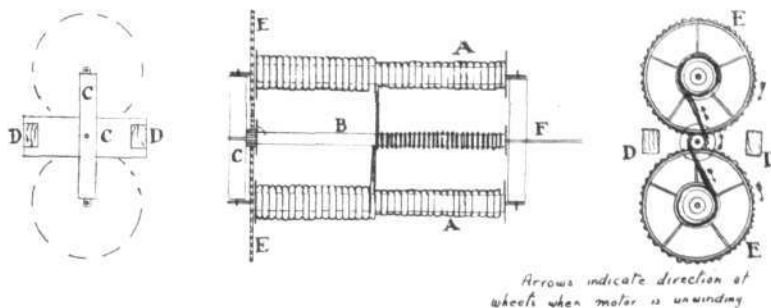
The model is a very good flyer, being exceptionally stable.

An Ingenious Rubber Motor for Models.

Mr. M. G. Parsons, writing from Potchefstroom, Transvaal, says:—"Many thanks for yours of the 26th October and criticism of my rubber motor. I have been away on active military service, and have only received your letter quite recently. I return the drawing herewith for publication, as you kindly suggest. When the motor is fully wound up, the thickness of rubber on the central shaft would, I think, make the diameters of the three shafts equal.

The ratio of rubber stretch would then be 10 to 1. As the motor unwinds the rubber on the outer shafts will increase their diameter so that the ratio will gradually fall off to perhaps 7 to 1.

"The weight of the framework and gears would, I hope, be less than that of the strong frame, necessary to support the tension of



Rubber motor for model aeroplanes by M. G. Parsons.—A, aluminium tubes on which the rubber is wound; B, aluminium tube of lighter section; C, end pieces of wooden motor chassis; D, longitudinal of wooden motor chassis; E, light steel gear wheels; F, propeller shaft.

ordinary twisted rubber motors. The compactness of the motor would, I think, make it adaptable to short tailed practical models.

"The amount of friction of the rubber can only be determined by experiment, but it is evident that a big source of friction in twisted rubber, namely, longitudinal tension, on a bearing behind the propeller is done away with.

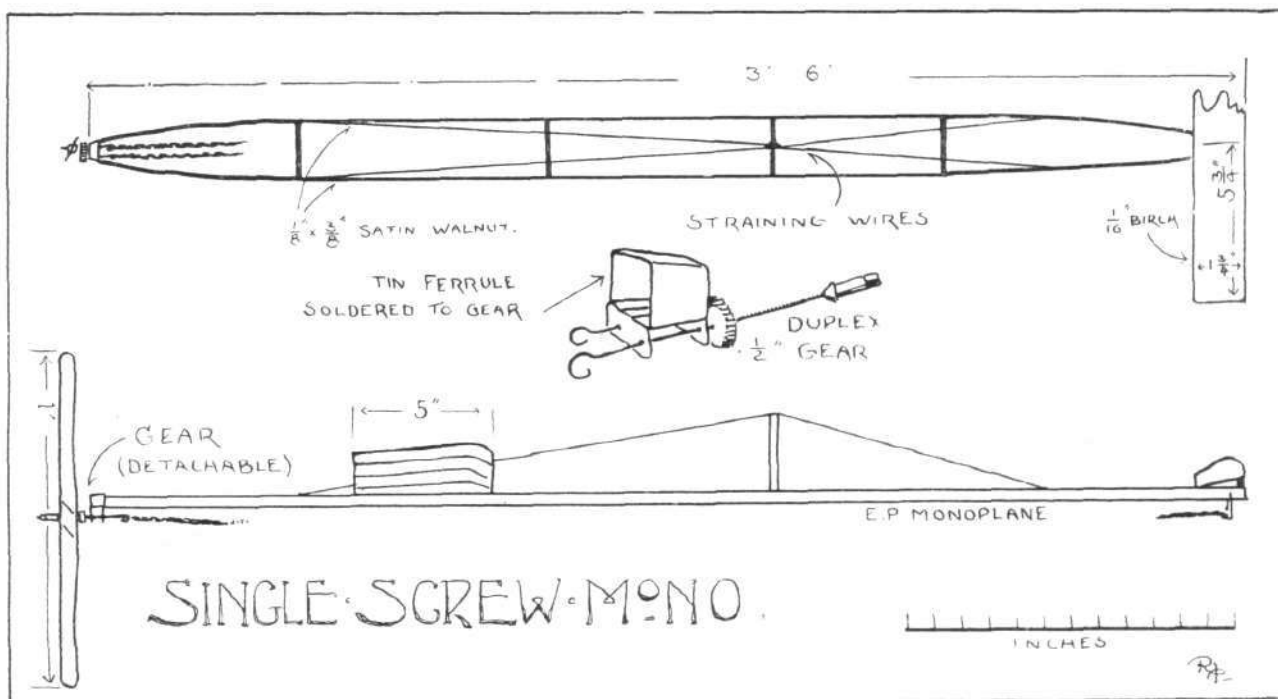
"I shall be glad if any of your readers care to experiment with this motor and find it useful."

Replies to Queries.

C. C. SLINGSBY.—On no account use or endeavour to use aluminium for a compressed-air container; you cannot solder *i.e.* thin sheet. When copper or brass foil wound with steel wire is perfectly satisfactory, why do you want to go out of your way to create difficulties? In reply to your second query, try D. Hiscox, Fairmount Road, Bexhill-on-Sea.

J. STANLEY HUNT.—The principle is exactly the same as the steam engine, and you can use any type of the latter, provided it is light enough. Considerable information has been given in recent numbers.

H. V. HALL.—A compressed air motor would be quite useless on the lines you suggest, viz., a direct backward acting jet or current of air. A screw or propeller acts on a large air surface, a jet only on a tiny surface, which it bores a hole in, as it were. You can drive an arrow-shaped instrument through the air quickly, endways on, with no appreciable resistance, but pick up, say, a large tea and try and move



Mr. Prockter's single-screw monoplane.

it broadside on through the air, and you feel the effect at once. Assuming that we had a 12-inch disc vessel with, say, hundreds of tiny pin holes through which the air rushed, then assuming for a moment that such gave some practical efficiency, we have to face the problem of the resistance to be overcome in driving such through the air. A 12-inch diameter propeller drives (far more effectively) an equal cylinder of air backwards, and there is comparatively speaking no resistance.

C. M. H. PEASY.—We do not supply scale drawings, but quite a number of the type you enquire about have appeared in back numbers, both British and American as well.

R. LANGLEY.—Of the two sketches you send we should advise the Morane type. The discrepancies in a certain pressure requiring a different number of pump strokes probably arises from the size of the pumps being different; also there may have been leakage in one case. No, we should not advise any form of gear. There is no need to use it in a flying boat if the motor, as well as the propeller, is mounted between the planes.

Queries

C. M. H. PEASY (164, Emscote Road, Warwick) desires to know the price of some one, two, or four cylinder petrol motors suitable for a model aeroplane.

"VICKERS" wishes to know some method of determining the correct distance (back along the body) of the main planes (top staggered forward) of a small tractor biplane. "I had," he says, "completed the model, and found on trial that it was very much over-elevated, so I have now decided to find the correct position instead of doing it by guesswork." Can any reader help—otherwise than by practical trial?

AFFILIATED MODEL CLUBS DIARY.

Club reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Paddington and Districts (77, SWINDERBY ROAD, WEMBLEY).

SATURDAY, FEB. 6TH, resumption of flying, weather permitting.

South-Western Aero Club (373, BRIXTON ROAD, S.W.).

FEB. 13TH. The tractor competition postponed from January 16th, will be held in Brockwell Park.

Stony Stratford and District Kite and Model Ae.C. (OLD STRATFORD).

FEB. 3RD, monthly meeting. Feb. 20th, monthly competition for r.o.s. twins and singles. Special suspension of Rule No. 18 for this competition. Members please bear in mind No. 17 re protectors.

UNAFFILIATED CLUBS.

Scottish Ae.S. Model Ae.C. (5, DOUNE QUADRANT, GLASGOW).

FEB. 6TH, Maxwell Park, tractors, &c. Feb. 20th, Paisley Racecourse, C.A. Model, &c.

Twickenham and District (74, CLIFDEN ROAD, TWICKENHAM). MEETING this week end at Fulwell Park.

ENEMY PATENTS RELATING TO AERONAUTICS.

THE following list of British patents which have been granted in favour of residents of Germany, Austria, or Hungary, is furnished in view of the new Patents Acts, which empower the Board of Trade to grant licences under certain conditions to British subjects to manufacture under enemy patents, and is specially compiled for FLIGHT, by Lewis Wm. Goold, Chartered Patent Agent, Enrolled Patent Attorney in the United States, 5, Corporation Street, Birmingham. It is desirable in the first instance to obtain a full copy of the patent specification (price 6d. each patent), and also the latest particulars upon the Patents Register. If any patent listed has been assigned to a non-enemy proprietor, the law does not apply.

No. 8069/12. Aerostats; cars. The frame of a rigid airship is protected and strengthened by a fabric saddle and end caps, from all of which and from the frame the load is flexibly suspended so that the weight is evenly distributed. Schutte, J., Germany. Dated November 11th, 1911.

No. 9958/12. Aerial machines without aerostats; cars. An aerial machine comprises a projectile shaped body surrounded by a similarly shaped rotary casing upon the surface of which helical propeller blades are fixed. At the rear of the apparatus the blades have extensions which project to a considerable extent. A plane is mounted over the body and is rigidly connected with the land wheel. The framing and steering surfaces are made of aluminium. Miede, M., Vienna.

No. 12061/12. Planes, arrangement and construction of. An aeroplane is provided with an almost or quite flat upper plane and lower plane which is inclined upwards towards the upper plane, the upper and lower planes being directed rearwardly at each side of the machine. The lower plane may be curved in transverse section or plane. One of the planes may project beyond the other, and there may be an opening in one of them. Bomhard, K., Berlin.

No. 12632/12. Aerial machines without aerostats; planes and the like, arrangement and construction of. A monoplane machine has a supporting frame arranged to form part of a continuous surface interrupted by the closed body. A keel plane extends centrally beneath and along the whole length of the body. To render the machine portable, the supporting frame may be adapted to fold up about longitudinally-arranged hinges connecting them to fixed inner plane sections. Pippart, H., and Noll, H., Germany.

Index and Title Page for Vol. VI.

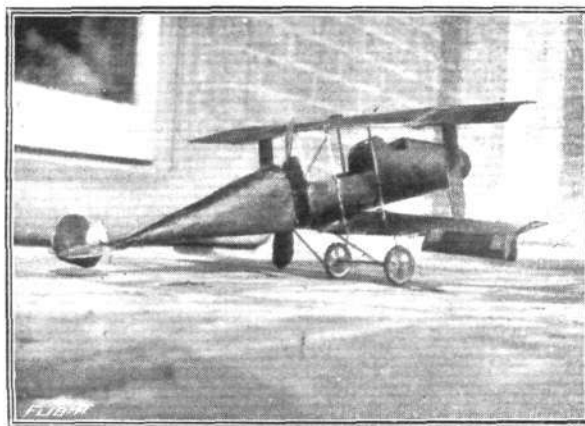
THE 8-page Index for Vol. VI of FLIGHT (January to December, 1914) is now ready, and can be had from the publishers, 44, St. Martin's Lane, London, W.C., price 2d. (3½d. post free). After February 21st the price will be 6d.

CORRESPONDENCE.

Tractor v. Propeller.

[1896] Kindly permit me to comment on "Tractor v. Propeller," by "Fregata," which appeared in FLIGHT dated January 15th. I also have been thinking of this subject for some time past, and have built a small model to illustrate my views.

It will be seen from the enclosed photo. that the machine is of the "pusher" type, but also is designed to give large range of



Mr. Spicer's aeroplane.

speed, together with a large range of vision for the pilot. The fuselage is built in two halves carefully streamlined, which are connected by a stout shaft running through the propeller, which is placed immediately behind the main planes, which are slightly staggered; the rear half of the fuselage is also braced.

By this method an excellent streamline is obtained, and the propeller, therefore, has more effect than on the ordinary "pushers," and, therefore, is still more effective than the tractor. It also combines the advantages of the fast "scout" with the advantages of the "pusher," which in both cases are very great.

There are several other points in the construction, but I cannot take up any more room in your valuable paper; but I thought that since the subject had been opened this account might interest your readers.

Wishing your excellent paper success.
31, Colville Gardens, Bayswater.

E. D. SPICER.

FLIGHT.

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